APPENDIX M: SPECIAL STUDIES

- Mathematics Claim/Target Simulation Study
- Linking BEACON and Giftedness Data
- Test Engagement Research

Mathematics Claim/Target Simulation Study Summary

Mathematics Claim/Target Simulation Study Summary

In the 2023-2024 school year, GaDOE will have established new content standards in Mathematics, and assessment scores reflecting new content standards will be reported to students for the first time. These new math standards reflect several key changes including a new hierarchical reporting structure for reporting domain scores. In addition to mathematics scores, more detailed information will be reported in terms of larger claims and more detailed targets. For example, a claim might be "numerical reasoning" with several smaller targets that reflect important subskills.

This memo presents a series of analyses wherein a current test form based on the current content standards was reconfigured to emulate a test based on new content standards. Specifically, DRC test developers took the existing test blueprints for the Spring 2022 mathematics assessments in Grade 6 and Algebra and provided an item-to-objective map that reflected the new standards. Using the banked item parameters, new domain scoring tables that reflect the new content standard were built. The alternate domain scoring tables were applied to the 2022 data and then the impact of the new tables was compared relative to the previous scoring tables.

It is important to note that domain performance is reported as a function of the probability of being proficient on the full assessment given performance on the domain. This probability is classified into three levels.

Test Development Input

DRC Test Development provided standards to Claim/Target mapping, which is presented in Tables 1 and 2 for Mathematics Grade 6 and ALG1 separately. TD also provided test maps with items mapped to new standards and new claim/target for the two mathematics assessments from Spring 2022 administration. The test form comparison between 2022 test forms and blueprint were presented in Tables 3 and 4.

Table 1. EOG Mathematics Grade 6 Standards to Claim/Target Mapping and Blueprint

Claims and Targets	Content Standards Assessed	Approximate # of Points
Numerical Reasoning		**29**
Solve relevant, mathematical problems involving operations with whole numbers, fractions, and decimal numbers.	6.NR.1	6
Apply operations with whole numbers, fractions, and decimals within relevant applications.	6.NR.2	8
Solve a variety of problems involving whole numbers and their opposites; model rational numbers on a number line to describe problems presented in relevant, mathematical situations.	6.NR.3	7
Solve a variety of contextual problems involving ratios, unit rates, equivalent ratios, percentages, and conversions within measurement systems using proportional reasoning.	6.NR.4	8
Geometric & Spatial Reasoning		**7**
Solve relevant problems involving area, surface area, and volume.	6.GSR.5	7
Patterning & Algebraic Reasoning		**22**
Identify, write, evaluate, and interpret numerical and algebraic expressions as mathematical models to explain authentic situations.	6.PAR.6	8
Write and solve one-step equations and inequalities as mathematical models to explain authentic, realistic situations.	6.PAR.7	7
Graph rational numbers as points on the coordinate plane to represent and solve contextual, mathematical problems; draw polygons using the coordinates for their vertices and find the length of a side of a polygon.	6.PAR.8	7
	Total	**58**

Table 2. EOC ALG1 Standards to Claim/Target Mapping and Blueprint

Claims and Targets	Content Standards Assessed	Approximate # of Points
Geometric & Spatial Reasoning		**6**
Solve problems involving distance, midpoint, slope, area, and perimeter to model and explain real-life phenomena.	A.GSR.3^{+}	6
Numerical Reasoning		**6**
Investigate rational and irrational numbers and rewrite expressions involving square roots and cube roots.	A.NR.5^{+}	6
Patterning & Algebraic Reasoning		**19**
Create, analyze, and solve linear inequalities in two variables and systems of linear inequalities to model real-life phenomena.	A.PAR.4^{+}	7
Build quadratic expressions and equations to represent and model real-life phenomena; solve quadratic equations in mathematically applicable situations.	A.PAR.6^{+}	6
Create and analyze exponential expressions and equations to represent and model real-life phenomena; solve exponential equations in mathematically applicable situations.	A.PAR.8^{+}	6
Functional & Graphical Reasoning		**21**
Construct and interpret arithmetic sequences as functions, algebraically and graphically, to model and explain real-life phenomena. Use formal notation to represent linear functions and the key characteristics of graphs of linear functions, and informally compare linear and non-linear functions using parent graphs.	A.FGR.2^{+}	7

Claims and Targets	Content Standards Assessed	Approximate # of Points
Construct and interpret quadratic functions from data points to model and explain real-life phenomena; describe key characteristics of the graph of a quadratic function to explain a mathematically applicable situation for which the graph serves as a model.	A.FGR.7+	7
Construct and analyze the graph of an exponential function to explain a mathematically applicable situation for which the graph serves as a model; compare exponential with linear and quadratic functions.	A.FGR.9+	7
Data & Statistical Reasoning		**6**
Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems.	A.DSR.10+	6
	Total	**58**

Table 3. EGA225 Mathematics Grade 6 Test Form Comparison: 2022 vs Blueprint

	Test Blueprint Requirement		Anchors		Spring Form A		Spring Form B		Spring Form C	
	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points
Numerical Reasoning	29		15		27		29		29	
6.NR.1		6		2		2		2		2
6.NR.2		8		5		10		10		10
6.NR.3		7		3		6		7		8
6.NR.4		8		5		9		10		9
Geometric & Spatial Reasoning	7		3		8		4		8	
6.GSR.5		7		3		8		4		8
Patterning & Algebraic Reasoning	22		9		19		20		17	
6.PAR.6		8		4		9		10		9
6.PAR.7		7		2		4		3		4
6.PAR.8		7		3		6		7		4
Total Test	**58**		**27**		**54**		**53**		**54**	

Table 4. EGA235 ALG1 Test Form Comparison: 2022 vs Blueprint

	Test Blueprint Requirement		Anchors		Spring Form A		Spring Form B		Spring Form C	
	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points
Geometric & Spatial Reasoning	6		0		0		0		0	
A.GSR.3		6		0		0		0		0
Numerical Reasoning	6		1		1		2		1	
A.NR.5		6		1		1		2		1
Patterning & Algebraic Reasoning	19		2		3		4		3	
A.PAR.4		7		2		3		2		3
A.PAR.6		6		2		5		2		5
A.PAR.8		6		2		3		4		3
Functional & Graphical Reasoning	21		17		32		35		30	
A.FGR.2		7		2		2		5		2
A.FGR.7		7		6		14		15		14
A.FGR.9		7		5		8		7		6
Data & Statistical Reasoning	6		4		8		8		8	
A.DSR.10		6		4		8		8		8
Total Test	**58**		**24**		**44**		**45**		**42**	

Updated Domain Tables –

Given there were only a few test takers of form C, only forms AB were included in this study. To create some pseudo domain information associated with the new standards based on this revised mapping, item parameters from the current item bank developed under the current implementation of the content standards were used. For targets(subdomains), we produced them with a minimum of six points. The claim/target scoring tables were presented in Tables 5 and 6.

Table 5. Mathematics Grade 6 Domain Scoring Tables

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
A	Claim	Numerical Reasoning (NR)	0	300	72	0.00	1	23
A	Claim	Numerical Reasoning (NR)	1	350	41	0.00	1	23
A	Claim	Numerical Reasoning (NR)	2	381	30	0.00	1	23
A	Claim	Numerical Reasoning (NR)	3	401	26	0.00	1	23
A	Claim	Numerical Reasoning (NR)	4	416	23	0.00	1	23
A	Claim	Numerical Reasoning (NR)	5	429	21	0.00	1	23
A	Claim	Numerical Reasoning (NR)	6	440	20	0.00	1	23
A	Claim	Numerical Reasoning (NR)	7	449	19	0.00	1	23
A	Claim	Numerical Reasoning (NR)	8	459	18	0.00	1	23
A	Claim	Numerical Reasoning (NR)	9	467	18	0.00	1	23
A	Claim	Numerical Reasoning (NR)	10	475	18	0.00	1	23
A	Claim	Numerical Reasoning (NR)	11	483	17	0.01	1	23
A	Claim	Numerical Reasoning (NR)	12	490	17	0.02	1	23
A	Claim	Numerical Reasoning (NR)	13	498	17	0.06	1	23
A	Claim	Numerical Reasoning (NR)	14	505	17	0.12	1	23
A	Claim	Numerical Reasoning (NR)	15	512	17	0.22	1	23
A	Claim	Numerical Reasoning (NR)	16	520	17	0.38	1	23
A	Claim	Numerical Reasoning (NR)	17	527	17	0.55	2	23
A	Claim	Numerical Reasoning (NR)	18	535	18	0.71	2	23
A	Claim	Numerical Reasoning (NR)	19	543	18	0.84	2	23
A	Claim	Numerical Reasoning (NR)	20	552	19	0.92	3	23
A	Claim	Numerical Reasoning (NR)	21	561	20	0.96	3	23
A	Claim	Numerical Reasoning (NR)	22	571	21	0.99	3	23
A	Claim	Numerical Reasoning (NR)	23	583	22	1.00	3	23
A	Claim	Numerical Reasoning (NR)	24	597	25	1.00	3	23
A	Claim	Numerical Reasoning (NR)	25	616	30	1.00	3	23
A	Claim	Numerical Reasoning (NR)	26	646	40	1.00	3	23
A	Claim	Numerical Reasoning (NR)	27	695	72	0.99	3	23
A	Claim	Patterning & Algebraic Reasoning (PAR)	0	311	72	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	1	360	40	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	2	389	30	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	3	408	25	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	4	423	22	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	5	434	21	0.00	1	16

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
A	Claim	Patterning & Algebraic Reasoning (PAR)	6	445	20	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	7	455	19	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	8	464	19	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	9	473	19	0.00	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	10	482	19	0.01	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	11	491	19	0.04	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	12	501	20	0.12	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	13	512	21	0.27	1	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	14	524	22	0.48	2	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	15	538	24	0.71	2	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	16	555	27	0.87	2	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	17	577	32	0.95	3	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	18	610	42	0.98	3	16
A	Claim	Patterning & Algebraic Reasoning (PAR)	19	662	73	0.97	3	16
A	Target	NR2	0	373	74	0.02	1	8
A	Target	NR2	1	426	43	0.01	1	8
A	Target	NR2	2	462	33	0.03	1	8
A	Target	NR2	3	486	29	0.09	1	8
A	Target	NR2	4	507	27	0.25	1	8
A	Target	NR2	5	525	26	0.50	2	8
A	Target	NR2	6	543	27	0.75	2	8
A	Target	NR2	7	562	28	0.91	3	8
A	Target	NR2	8	584	32	0.97	3	8
A	Target	NR2	9	617	41	0.99	3	8
A	Target	NR2	10	667	72	0.98	3	8
A	Target	NR3	0	341	75	0.01	1	6
A	Target	NR3	1	399	46	0.00	1	6
A	Target	NR3	2	441	37	0.01	1	6
A	Target	NR3	3	473	34	0.06	1	6
A	Target	NR3	4	504	36	0.28	1	6
A	Target	NR3	5	544	44	0.67	2	6
A	Target	NR3	6	599	74	0.84	3	6
A	Target	NR4	0	336	74	0.01	1	7
A	Target	NR4	1	391	45	0.00	1	7
A	Target	NR4	2	430	35	0.00	1	7
A	Target	NR4	3	459	32	0.02	1	7
A	Target	NR4	4	483	30	0.08	1	7
A	Target	NR4	5	506	30	0.26	1	7
A	Target	NR4	6	531	32	0.57	2	7
A	Target	NR4	7	559	35	0.83	2	7
A	Target	NR4	8	598	45	0.95	3	7
A	Target	NR4	9	653	75	0.96	3	7
A	Target	PAR6	0	344	73	0.01	1	8
A	Target	PAR6	1	397	43	0.00	1	8

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
A	Target	PAR6	2	432	33	0.00	1	8
A	Target	PAR6	3	457	30	0.01	1	8
A	Target	PAR6	4	479	29	0.06	1	8
A	Target	PAR6	5	500	29	0.19	1	8
A	Target	PAR6	6	523	31	0.47	2	8
A	Target	PAR6	7	550	35	0.76	2	8
A	Target	PAR6	8	589	45	0.92	3	8
A	Target	PAR6	9	645	75	0.95	3	8
A	Target	PAR8	0	361	73	0.01	1	5
A	Target	PAR8	1	413	43	0.00	1	5
A	Target	PAR8	2	448	33	0.01	1	5
A	Target	PAR8	3	474	31	0.05	1	5
A	Target	PAR8	4	501	35	0.25	1	5
A	Target	PAR8	5	543	47	0.65	2	5
A	Target	PAR8	6	604	77	0.85	3	5
B	Claim	Numerical Reasoning (NR)	0	317	72	0.00	1	23
B	Claim	Numerical Reasoning (NR)	1	366	40	0.00	1	23
B	Claim	Numerical Reasoning (NR)	2	395	29	0.00	1	23
B	Claim	Numerical Reasoning (NR)	3	413	25	0.00	1	23
B	Claim	Numerical Reasoning (NR)	4	427	22	0.00	1	23
B	Claim	Numerical Reasoning (NR)	5	438	20	0.00	1	23
B	Claim	Numerical Reasoning (NR)	6	448	19	0.00	1	23
B	Claim	Numerical Reasoning (NR)	7	456	18	0.00	1	23
B	Claim	Numerical Reasoning (NR)	8	464	17	0.00	1	23
B	Claim	Numerical Reasoning (NR)	9	472	17	0.00	1	23
B	Claim	Numerical Reasoning (NR)	10	479	16	0.00	1	23
B	Claim	Numerical Reasoning (NR)	11	485	16	0.01	1	23
B	Claim	Numerical Reasoning (NR)	12	492	16	0.02	1	23
B	Claim	Numerical Reasoning (NR)	13	498	16	0.05	1	23
B	Claim	Numerical Reasoning (NR)	14	504	16	0.09	1	23
B	Claim	Numerical Reasoning (NR)	15	510	16	0.17	1	23
B	Claim	Numerical Reasoning (NR)	16	517	16	0.31	1	23
B	Claim	Numerical Reasoning (NR)	17	523	16	0.45	2	23
B	Claim	Numerical Reasoning (NR)	18	530	16	0.62	2	23
B	Claim	Numerical Reasoning (NR)	19	536	16	0.75	2	23
B	Claim	Numerical Reasoning (NR)	20	543	17	0.86	2	23
B	Claim	Numerical Reasoning (NR)	21	551	17	0.94	3	23
B	Claim	Numerical Reasoning (NR)	22	559	18	0.97	3	23
B	Claim	Numerical Reasoning (NR)	23	568	19	0.99	3	23
B	Claim	Numerical Reasoning (NR)	24	578	20	1.00	3	23
B	Claim	Numerical Reasoning (NR)	25	589	22	1.00	3	23
B	Claim	Numerical Reasoning (NR)	26	603	25	1.00	3	23
B	Claim	Numerical Reasoning (NR)	27	622	29	1.00	3	23
B	Claim	Numerical Reasoning (NR)	28	651	40	1.00	3	23

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
B	Claim	Numerical Reasoning (NR)	29	700	71	0.99	3	23
B	Claim	Patterning & Algebraic Reasoning (PAR)	0	303	72	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	1	353	41	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	2	383	30	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	3	403	26	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	4	418	23	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	5	430	22	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	6	442	21	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	7	452	20	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	8	462	20	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	9	472	19	0.00	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	10	481	19	0.01	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	11	491	20	0.04	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	12	501	20	0.12	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	13	512	21	0.27	1	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	14	523	22	0.46	2	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	15	536	23	0.68	2	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	16	550	24	0.85	2	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	17	567	27	0.94	3	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	18	588	31	0.98	3	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	19	621	42	0.99	3	18
B	Claim	Patterning & Algebraic Reasoning (PAR)	20	672	73	0.98	3	18
B	Target	NR2	0	368	73	0.02	1	8
B	Target	NR2	1	421	43	0.01	1	8
B	Target	NR2	2	457	33	0.02	1	8
B	Target	NR2	3	482	30	0.08	1	8
B	Target	NR2	4	504	29	0.23	1	8
B	Target	NR2	5	524	28	0.49	2	8
B	Target	NR2	6	544	28	0.75	2	8
B	Target	NR2	7	565	29	0.92	3	8
B	Target	NR2	8	589	32	0.98	3	8
B	Target	NR2	9	622	42	0.99	3	8
B	Target	NR2	10	673	73	0.98	3	8
B	Target	NR3	0	362	73	0.01	1	6
B	Target	NR3	1	414	43	0.00	1	6
B	Target	NR3	2	449	33	0.01	1	6
B	Target	NR3	3	474	30	0.04	1	6
B	Target	NR3	4	498	31	0.19	1	6
B	Target	NR3	5	524	33	0.49	2	6
B	Target	NR3	6	559	43	0.79	2	6
B	Target	NR3	7	611	73	0.88	3	6
B	Target	NR4	0	365	73	0.01	1	7
B	Target	NR4	1	418	43	0.01	1	7
B	Target	NR4	2	452	32	0.01	1	7

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
B	Target	NR4	3	476	28	0.04	1	7
B	Target	NR4	4	494	26	0.12	1	7
B	Target	NR4	5	511	25	0.29	1	7
B	Target	NR4	6	527	26	0.53	2	7
B	Target	NR4	7	545	28	0.76	2	7
B	Target	NR4	8	568	32	0.91	3	7
B	Target	NR4	9	603	43	0.97	3	7
B	Target	NR4	10	657	74	0.96	3	7
B	Target	PAR6	0	335	73	0.00	1	9
B	Target	PAR6	1	387	43	0.00	1	9
B	Target	PAR6	2	422	33	0.00	1	9
B	Target	PAR6	3	446	29	0.00	1	9
B	Target	PAR6	4	467	28	0.02	1	9
B	Target	PAR6	5	486	27	0.07	1	9
B	Target	PAR6	6	505	28	0.24	1	9
B	Target	PAR6	7	527	30	0.53	2	9
B	Target	PAR6	8	553	34	0.79	2	9
B	Target	PAR6	9	591	44	0.93	3	9
B	Target	PAR6	10	646	74	0.95	3	9
B	Target	PAR8	0	347	74	0.01	1	6
B	Target	PAR8	1	402	45	0.00	1	6
B	Target	PAR8	2	441	36	0.01	1	6
B	Target	PAR8	3	473	34	0.06	1	6
B	Target	PAR8	4	503	35	0.26	1	6
B	Target	PAR8	5	536	38	0.61	2	6
B	Target	PAR8	6	579	46	0.88	2	6
B	Target	PAR8	7	635	75	0.93	3	6

Table 6. ALG1 Domain Scoring Tables

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
A	Claim	Data & Statistical Reasoning (DSR)	0	284	102	0.01	1	6
A	Claim	Data & Statistical Reasoning (DSR)	1	356	59	0.00	1	6
A	Claim	Data & Statistical Reasoning (DSR)	2	404	45	0.00	1	6
A	Claim	Data & Statistical Reasoning (DSR)	3	437	41	0.02	1	6
A	Claim	Data & Statistical Reasoning (DSR)	4	467	40	0.07	1	6
A	Claim	Data & Statistical Reasoning (DSR)	5	497	41	0.25	1	6
A	Claim	Data & Statistical Reasoning (DSR)	6	531	46	0.55	2	6
A	Claim	Data & Statistical Reasoning (DSR)	7	581	60	0.82	2	6
A	Claim	Data & Statistical Reasoning (DSR)	8	653	102	0.90	3	6
A	Claim	Functional & Graphical Reasoning (FGR)	0	260	101	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	1	329	57	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	2	371	41	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	3	397	35	0.00	1	21

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
A	Claim	Functional & Graphical Reasoning (FGR)	4	417	31	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	5	433	28	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	6	447	27	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	7	459	25	0.00	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	8	470	24	0.01	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	9	481	23	0.03	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	10	490	23	0.06	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	11	500	22	0.13	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	12	509	22	0.23	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	13	518	22	0.38	1	21
A	Claim	Functional & Graphical Reasoning (FGR)	14	527	22	0.54	2	21
A	Claim	Functional & Graphical Reasoning (FGR)	15	536	22	0.69	2	21
A	Claim	Functional & Graphical Reasoning (FGR)	16	545	23	0.81	2	21
A	Claim	Functional & Graphical Reasoning (FGR)	17	555	24	0.89	2	21
A	Claim	Functional & Graphical Reasoning (FGR)	18	566	25	0.95	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	19	577	26	0.98	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	20	590	28	0.99	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	21	606	30	1.00	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	22	624	34	1.00	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	23	649	41	1.00	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	24	690	56	1.00	3	21
A	Claim	Functional & Graphical Reasoning (FGR)	25	757	100	0.99	3	21
A	Target	FGR7	0	315	101	0.02	1	12
A	Target	FGR7	1	384	57	0.01	1	12
A	Target	FGR7	2	428	42	0.01	1	12
A	Target	FGR7	3	455	36	0.03	1	12
A	Target	FGR7	4	476	32	0.06	1	12
A	Target	FGR7	5	494	30	0.15	1	12
A	Target	FGR7	6	509	29	0.29	1	12
A	Target	FGR7	7	524	28	0.49	2	12
A	Target	FGR7	8	539	28	0.69	2	12
A	Target	FGR7	9	553	29	0.83	2	12
A	Target	FGR7	10	569	30	0.93	3	12
A	Target	FGR7	11	586	32	0.97	3	12
A	Target	FGR7	12	607	35	0.99	3	12
A	Target	FGR7	13	634	42	1.00	3	12
A	Target	FGR7	14	676	57	1.00	3	12
A	Target	FGR7	15	744	101	0.98	3	12
A	Target	FGR9	0	297	103	0.01	1	7
A	Target	FGR9	1	372	60	0.01	1	7
A	Target	FGR9	2	422	47	0.01	1	7
A	Target	FGR9	3	457	41	0.05	1	7
A	Target	FGR9	4	485	38	0.15	1	7
A	Target	FGR9	5	512	38	0.37	1	7

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
A	Target	FGR9	6	541	43	0.65	2	7
A	Target	FGR9	7	584	57	0.85	2	7
A	Target	FGR9	8	653	101	0.90	3	7
B	Claim	Data & Statistical Reasoning (DSR)	0	302	101	0.01	1	6
B	Claim	Data & Statistical Reasoning (DSR)	1	372	58	0.00	1	6
B	Claim	Data & Statistical Reasoning (DSR)	2	417	44	0.01	1	6
B	Claim	Data & Statistical Reasoning (DSR)	3	448	39	0.02	1	6
B	Claim	Data & Statistical Reasoning (DSR)	4	475	38	0.09	1	6
B	Claim	Data & Statistical Reasoning (DSR)	5	502	39	0.28	1	6
B	Claim	Data & Statistical Reasoning (DSR)	6	534	45	0.58	2	6
B	Claim	Data & Statistical Reasoning (DSR)	7	580	59	0.82	2	6
B	Claim	Data & Statistical Reasoning (DSR)	8	652	102	0.89	3	6
B	Claim	Functional & Graphical Reasoning (FGR)	0	229	101	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	1	297	57	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	2	339	41	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	3	366	35	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	4	385	31	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	5	402	29	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	6	416	27	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	7	429	26	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	8	441	25	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	9	452	24	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	10	462	24	0.00	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	11	472	23	0.01	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	12	482	23	0.03	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	13	491	23	0.07	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	14	500	23	0.14	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	15	510	23	0.26	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	16	519	23	0.40	1	24
B	Claim	Functional & Graphical Reasoning (FGR)	17	529	23	0.57	2	24
B	Claim	Functional & Graphical Reasoning (FGR)	18	539	23	0.73	2	24
B	Claim	Functional & Graphical Reasoning (FGR)	19	549	24	0.84	2	24
B	Claim	Functional & Graphical Reasoning (FGR)	20	559	25	0.91	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	21	571	25	0.97	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	22	583	27	0.98	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	23	597	28	0.99	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	24	613	31	1.00	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	25	633	35	1.00	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	26	659	41	1.00	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	27	700	56	1.00	3	24
B	Claim	Functional & Graphical Reasoning (FGR)	28	769	101	0.99	3	24
B	Target	FGR7	0	304	101	0.01	1	12
B	Target	FGR7	1	373	57	0.00	1	12
B	Target	FGR7	2	417	42	0.01	1	12

Form	Claim/Target	Title	Raw Score	SS	SEM	P	Domain PL	#OfItems
B	Target	FGR7	3	445	36	0.01	1	12
B	Target	FGR7	4	467	33	0.04	1	12
B	Target	FGR7	5	485	31	0.10	1	12
B	Target	FGR7	6	502	29	0.21	1	12
B	Target	FGR7	7	517	29	0.39	1	12
B	Target	FGR7	8	532	29	0.60	2	12
B	Target	FGR7	9	547	29	0.78	2	12
B	Target	FGR7	10	563	29	0.90	3	12
B	Target	FGR7	11	579	31	0.96	3	12
B	Target	FGR7	12	597	33	0.99	3	12
B	Target	FGR7	13	619	36	1.00	3	12
B	Target	FGR7	14	646	42	1.00	3	12
B	Target	FGR7	15	689	57	1.00	3	12
B	Target	FGR7	16	759	101	0.99	3	12
B	Target	FGR9	0	286	102	0.01	1	7
B	Target	FGR9	1	359	60	0.00	1	7
B	Target	FGR9	2	408	47	0.01	1	7
B	Target	FGR9	3	444	43	0.03	1	7
B	Target	FGR9	4	477	43	0.13	1	7
B	Target	FGR9	5	513	46	0.40	1	7
B	Target	FGR9	6	562	60	0.73	2	7
B	Target	FGR9	7	635	102	0.86	3	7

Results –

After applying revised claim/target tables to Spring 2022 data, following crosstabs were produced.

a. Targets versus the Claims
    i. This was to compare the consistency of classification of the target classification with the claim classification.
    ii. This was done for the target subset versus their claim "parents"
b. Claims versus the Performance Levels
    i. This was to compare the consistency of the claim classifications with the overall performance levels.
c. Targets versus the Performance Levels
    i. This was provided to compare correspondence of small targets and the total test performance. For example, do we see "distinguished student" performing poorly on the targets.

The crosstabs are presented in Tables 7 to 46. Given all scoring tables are all expressed on the same scale and based on the global calibration parameters, all crosstabs show internally consistency as expected.

The domain/subdomain reliabilities were also provided in Tables 47 and 48. The estimated reliability range from 0.56 to 0.87 for EOG Mathematics Grade 6, and from 0.57 to 0.88 for EOC ALG1. These values are comparable to reliability estimates in previous ELA domain change study.

Caveats –

Note that this set of analyses was designed to emulate a set of updated scoring tables for a test that has not been created yet and reflect a set of item statistics collected from student learning mathematics using the current content standards. The new content standards are operational in 2023-2024 and assessments that are built to measure mathematics using these new standards will be administered to students at that point.

Table 7. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_NR by ObjPL_NR2				
ObjPL_NR(Numerical Reasoning)	ObjPL_NR2			
Frequency Percent	1	2	3	Total
1	47579 63.78	5593 7.50	516 0.69	53688 71.96
2	1448 1.94	4285 5.74	2160 2.90	7893 10.58
3	60 0.08	1716 2.30	11247 15.08	13023 17.46
Total	49087 65.80	11594 15.54	13923 18.66	74604 100.00

Table 8. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_NR by ObjPL_NR3				
ObjPL_NR(Numerical Reasoning)	ObjPL_NR3			
Frequency Percent	1	2	3	Total
1	43635 58.49	7881 10.56	2172 2.91	53688 71.96
2	2237 3.00	3473 4.66	2183 2.93	7893 10.58
3	964 1.29	3915 5.25	8144 10.92	13023 17.46
Total	46836 62.78	15269 20.47	12499 16.75	74604 100.00

Table 9. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_NR by ObjPL_NR4				
ObjPL_NR(Numerical Reasoning)	ObjPL_NR4			
Frequency Percent	1	2	3	Total
1	47151 63.20	6338 8.50	199 0.27	53688 71.96
2	2506 3.36	4709 6.31	678 0.91	7893 10.58
3	620 0.83	6400 8.58	6003 8.05	13023 17.46
Total	50277 67.39	17447 23.39	6880 9.22	74604 100.00

Table 10. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_PAR by ObjPL_PAR6				
ObjPL_PAR(Patterning & Algebraic Reasoning)	ObjPL_PAR6			
Frequency Percent	1	2	3	Total
1	42176 56.53	5302 7.11	112 0.15	47590 63.79
2	2068 2.77	11395 15.27	2268 3.04	15731 21.09
3	0 0.00	1800 2.41	9483 12.71	11283 15.12
Total	44244 59.31	18497 24.79	11863 15.90	74604 100.00

Table 11. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_PAR by ObjPL_PAR8				
ObjPL_PAR(Patterning & Algebraic Reasoning)	ObjPL_PAR8			
Frequency Percent	1	2	3	Total
1	40907 54.83	5722 7.67	961 1.29	47590 63.79
2	4447 5.96	7995 10.72	3289 4.41	15731 21.09
3	281 0.38	3748 5.02	7254 9.72	11283 15.12
Total	45635 61.17	17465 23.41	11504 15.42	74604 100.00

Table 12. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_NR by ObjPL_NR2				
ObjPL_NR(Numerical Reasoning)	ObjPL_NR2			
Frequency Percent	1	2	3	Total
1	29400 56.08	4219 8.05	266 0.51	33885 64.63
2	2551 4.87	4077 7.78	1231 2.35	7859 14.99
3	222 0.42	2182 4.16	8278 15.79	10682 20.38
Total	32173 61.37	10478 19.99	9775 18.65	52426 100.00

Table 13. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_NR by ObjPL_NR3				
ObjPL_NR(Numerical Reasoning)	ObjPL_NR3			
Frequency Percent	1	2	3	Total
1	24759 47.23	8429 16.08	697 1.33	33885 64.63
2	991 1.89	5162 9.85	1706 3.25	7859 14.99
3	155 0.30	4305 8.21	6222 11.87	10682 20.38
Total	25905 49.41	17896 34.14	8625 16.45	52426 100.00

Table 14. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_NR by ObjPL_NR4				
ObjPL_NR(Numerical Reasoning)	ObjPL_NR4			
Frequency Percent	1	2	3	Total
1	30437 58.06	3237 6.17	211 0.40	33885 64.63
2	2024 3.86	4444 8.48	1391 2.65	7859 14.99
3	204 0.39	2711 5.17	7767 14.82	10682 20.38
Total	32665 62.31	10392 19.82	9369 17.87	52426 100.00

Table 15. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_PAR by ObjPL_PAR6				
ObjPL_PAR(Patterning & Algebraic Reasoning)	ObjPL_PAR6			
Frequency Percent	1	2	3	Total
1	26815 51.15	2682 5.12	39 0.07	29536 56.34
2	2285 4.36	8160 15.56	1465 2.79	11910 22.72
3	0 0.00	2752 5.25	8228 15.69	10980 20.94
Total	29100 55.51	13594 25.93	9732 18.56	52426 100.00

Table 16. EOG Mathematics Grade 6 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_PAR by ObjPL_PAR8				
ObjPL_PAR(Patterning & Algebraic Reasoning)	ObjPL_PAR8			
Frequency Percent	1	2	3	Total
1	23888 45.57	5551 10.59	97 0.19	29536 56.34
2	3458 6.60	7931 15.13	521 0.99	11910 22.72
3	151 0.29	6590 12.57	4239 8.09	10980 20.94
Total	27497 52.45	20072 38.29	4857 9.26	52426 100.00

Table 17. EOG Mathematics Grade 6 Crosstab between Overall PL and Claim PL, Form A

Table of PL_MA by ObjPL_NR				
PL_MA(Math - Achievement Level)	ObjPL_NR(Numerical Reasoning)			
Frequency Percent	1	2	3	Total
1	27616 37.02	0 0.00	0 0.00	27616 37.02
2	23633 31.68	1706 2.29	56 0.08	25395 34.04
3	2439 3.27	6181 8.29	6155 8.25	14775 19.80
4	0 0.00	6 0.01	6812 9.13	6818 9.14
Total	53688 71.96	7893 10.58	13023 17.46	74604 100.00

Table 18. EOG Mathematics Grade 6 Crosstab between Overall PL and Claim PL, Form A

Table of PL_MA by ObjPL_PAR				
PL_MA(Math - Achievement Level)	ObjPL_PAR(Patterning & Algebraic Reasoning)			
Frequency Percent	1	2	3	Total
1	27602 37.00	14 0.02	0 0.00	27616 37.02
2	18737 25.12	6363 8.53	295 0.40	25395 34.04
3	1250 1.68	8689 11.65	4836 6.48	14775 19.80
4	1 0.00	665 0.89	6152 8.25	6818 9.14
Total	47590 63.79	15731 21.09	11283 15.12	74604 100.00

Table 19. EOG Mathematics Grade 6 Crosstab between Overall PL and Claim PL, Form B

Table of PL_MA by ObjPL_NR				
PL_MA(Math - Achievement Level)	ObjPL_NR(Numerical Reasoning)			
Frequency Percent	1	2	3	Total
1	14123 26.94	0 0.00	0 0.00	14123 26.94
2	18551 35.39	1864 3.56	13 0.02	20428 38.97
3	1211 2.31	5995 11.44	5211 9.94	12417 23.68
4	0 0.00	0 0.00	5458 10.41	5458 10.41
Total	33885 64.63	7859 14.99	10682 20.38	52426 100.00

Table 20. EOG Mathematics Grade 6 Crosstab between Overall PL and Claim PL, Form B

Table of PL_MA by ObjPL_PAR				
PL_MA(Math - Achievement Level)	ObjPL_PAR(Patterning & Algebraic Reasoning)			
Frequency Percent	1	2	3	Total
1	14115 26.92	8 0.02	0 0.00	14123 26.94
2	14690 28.02	5359 10.22	379 0.72	20428 38.97
3	731 1.39	6331 12.08	5355 10.21	12417 23.68
4	0 0.00	212 0.40	5246 10.01	5458 10.41
Total	29536 56.34	11910 22.72	10980 20.94	52426 100.00

Table 21. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_NR2				
PL_MA(Math - Achievement Level)	ObjPL_NR2			
Frequency Percent	1	2	3	Total
1	27135 36.37	476 0.64	5 0.01	27616 37.02
2	19375 25.97	5185 6.95	835 1.12	25395 34.04
3	2575 3.45	5697 7.64	6503 8.72	14775 19.80
4	2 0.00	236 0.32	6580 8.82	6818 9.14
Total	49087 65.80	11594 15.54	13923 18.66	74604 100.00

Table 22. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_NR3				
PL_MA(Math - Achievement Level)	ObjPL_NR3			
Frequency Percent	1	2	3	Total
1	26618 35.68	896 1.20	102 0.14	27616 37.02
2	16486 22.10	6785 9.09	2124 2.85	25395 34.04
3	3518 4.72	6041 8.10	5216 6.99	14775 19.80
4	214 0.29	1547 2.07	5057 6.78	6818 9.14
Total	46836 62.78	15269 20.47	12499 16.75	74604 100.00

Table 23. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_NR4				
PL_MA(Math - Achievement Level)	ObjPL_NR4			
Frequency Percent	1	2	3	Total
1	27091 36.31	525 0.70	0 0.00	27616 37.02
2	19347 25.93	5829 7.81	219 0.29	25395 34.04
3	3753 5.03	8647 11.59	2375 3.18	14775 19.80
4	86 0.12	2446 3.28	4286 5.75	6818 9.14
Total	50277 67.39	17447 23.39	6880 9.22	74604 100.00

Table 24. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_PAR6				
PL_MA(Math - Achievement Level)	ObjPL_PAR6			
Frequency Percent	1	2	3	Total
1	27068 36.28	547 0.73	1 0.00	27616 37.02
2	15834 21.22	8793 11.79	768 1.03	25395 34.04
3	1334 1.79	8235 11.04	5206 6.98	14775 19.80
4	8 0.01	922 1.24	5888 7.89	6818 9.14
Total	44244 59.31	18497 24.79	11863 15.90	74604 100.00

Table 25. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_PAR8				
PL_MA(Math - Achievement Level)	ObjPL_PAR8			
Frequency Percent	1	2	3	Total
1	26371 35.35	1129 1.51	116 0.16	27616 37.02
2	15425 20.68	7708 10.33	2262 3.03	25395 34.04
3	3529 4.73	6529 8.75	4717 6.32	14775 19.80
4	310 0.42	2099 2.81	4409 5.91	6818 9.14
Total	45635 61.17	17465 23.41	11504 15.42	74604 100.00

Table 26. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_NR2				
PL_MA(Math - Achievement Level)	ObjPL_NR2			
Frequency Percent	1	2	3	Total
1	13647 26.03	469 0.89	7 0.01	14123 26.94
2	15710 29.97	4297 8.20	421 0.80	20428 38.97
3	2805 5.35	5389 10.28	4223 8.06	12417 23.68
4	11 0.02	323 0.62	5124 9.77	5458 10.41
Total	32173 61.37	10478 19.99	9775 18.65	52426 100.00

Table 27. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_NR3				
PL_MA(Math - Achievement Level)	ObjPL_NR3			
Frequency Percent	1	2	3	Total
1	13554 25.85	562 1.07	7 0.01	14123 26.94
2	11084 21.14	8366 15.96	978 1.87	20428 38.97
3	1252 2.39	7446 14.20	3719 7.09	12417 23.68
4	15 0.03	1522 2.90	3921 7.48	5458 10.41
Total	25905 49.41	17896 34.14	8625 16.45	52426 100.00

Table 28. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_NR4				
PL_MA(Math - Achievement Level)	ObjPL_NR4			
Frequency Percent	1	2	3	Total
1	14033 26.77	89 0.17	1 0.00	14123 26.94
2	16334 31.16	3691 7.04	403 0.77	20428 38.97
3	2287 4.36	5980 11.41	4150 7.92	12417 23.68
4	11 0.02	632 1.21	4815 9.18	5458 10.41
Total	32665 62.31	10392 19.82	9369 17.87	52426 100.00

Table 29. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_PAR6				
PL_MA(Math - Achievement Level)	ObjPL_PAR6			
Frequency Percent	1	2	3	Total
1	14024 26.75	98 0.19	1 0.00	14123 26.94
2	13831 26.38	6045 11.53	552 1.05	20428 38.97
3	1237 2.36	6759 12.89	4421 8.43	12417 23.68
4	8 0.02	692 1.32	4758 9.08	5458 10.41
Total	29100 55.51	13594 25.93	9732 18.56	52426 100.00

Table 30. EOG Mathematics Grade 6 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_PAR8				
PL_MA(Math - Achievement Level)	ObjPL_PAR8			
Frequency Percent	1	2	3	Total
1	12983 24.76	1132 2.16	8 0.02	14123 26.94
2	12019 22.93	8021 15.30	388 0.74	20428 38.97
3	2387 4.55	8282 15.80	1748 3.33	12417 23.68
4	108 0.21	2637 5.03	2713 5.17	5458 10.41
Total	27497 52.45	20072 38.29	4857 9.26	52426 100.00

Table 31. EOC ALG1 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_FGR by ObjPL_FGR7				
ObjPL_FGR(Functional & Graphical Reasoning)	ObjPL_FGR7			
Frequency Percent	1	2	3	Total
1	34038 53.53	4231 6.65	31 0.05	38300 60.23
2	1442 2.27	8390 13.19	1553 2.44	11385 17.90
3	0 0.00	1602 2.52	12303 19.35	13905 21.87
Total	35480 55.79	14223 22.37	13887 21.84	63590 100.00

Table 32. EOC ALG1 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_FGR by ObjPL_FGR9				
ObjPL_FGR(Functional & Graphical Reasoning)	ObjPL_FGR9			
Frequency Percent	1	2	3	Total
1	34643 54.48	3531 5.55	126 0.20	38300 60.23
2	2769 4.35	7171 11.28	1445 2.27	11385 17.90
3	269 0.42	5958 9.37	7678 12.07	13905 21.87
Total	37681 59.26	16660 26.20	9249 14.54	63590 100.00

Table 33. EOC ALG1 Crosstab between Claim PL and Target PL, Form A

Table of ObjPL_DSR by ObjPL_DSR10				
ObjPL_DSR(Data & Statistical Reasoning)	ObjPL_DSR10			
Frequency Percent	1	2	3	Total
1	38496 60.54	0 0.00	0 0.00	38496 60.54
2	0 0.00	19695 30.97	0 0.00	19695 30.97
3	0 0.00	0 0.00	5399 8.49	5399 8.49
Total	38496 60.54	19695 30.97	5399 8.49	63590 100.00

Note: DSR claim only includes DSR10 target.

Table 34. EOC ALG1 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_FGR by ObjPL_FGR7				
ObjPL_FGR(Functional & Graphical Reasoning)	ObjPL_FGR7			
Frequency Percent	1	2	3	Total
1	23288 44.66	3268 6.27	601 1.15	27157 52.08
2	941 1.80	3263 6.26	3084 5.91	7288 13.98
3	0 0.00	608 1.17	17088 32.77	17696 33.94
Total	24229 46.47	7139 13.69	20773 39.84	52141 100.00

Table 35. EOC ALG1 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_FGR by ObjPL_FGR9				
ObjPL_FGR(Functional & Graphical Reasoning)	ObjPL_FGR9			
Frequency Percent	1	2	3	Total
1	24627 47.23	2157 4.14	373 0.72	27157 52.08
2	4236 8.12	2196 4.21	856 1.64	7288 13.98
3	2965 5.69	5703 10.94	9028 17.31	17696 33.94
Total	31828 61.04	10056 19.29	10257 19.67	52141 100.00

Table 36. EOC ALG1 Crosstab between Claim PL and Target PL, Form B

Table of ObjPL_DSR by ObjPL_DSR10				
ObjPL_DSR(Data & Statistical Reasoning)	ObjPL_DSR10			
Frequency Percent	1	2	3	Total
1	29620 56.81	0 0.00	0 0.00	29620 56.81
2	0 0.00	16593 31.82	0 0.00	16593 31.82
3	0 0.00	0 0.00	5928 11.37	5928 11.37
Total	29620 56.81	16593 31.82	5928 11.37	52141 100.00

Note: DSR claim only includes DSR10 target.

Table 37. EOC ALG1 Crosstab between Overall PL and Claim PL, Form A

Table of PL_MA by ObjPL_FGR				
PL_MA(Math - Achievement Level)	ObjPL_FGR(Functional & Graphical Reasoning)			
Frequency Percent	1	2	3	Total
1	19854 31.22	0 0.00	0 0.00	19854 31.22
2	17488 27.50	3229 5.08	28 0.04	20745 32.62
3	958 1.51	8153 12.82	7162 11.26	16273 25.59
4	0 0.00	3 0.00	6715 10.56	6718 10.56
Total	38300 60.23	11385 17.90	13905 21.87	63590 100.00

Table 38. EOC ALG1 Crosstab between Overall PL and Claim PL, Form A

Table of PL_MA by ObjPL_DSR				
PL_MA(Math - Achievement Level)	ObjPL_DSR(Data & Statistical Reasoning)			
Frequency Percent	1	2	3	Total
1	19283 30.32	569 0.89	2 0.00	19854 31.22
2	14972 23.54	5544 8.72	229 0.36	20745 32.62
3	4096 6.44	10225 16.08	1952 3.07	16273 25.59
4	145 0.23	3357 5.28	3216 5.06	6718 10.56
Total	38496 60.54	19695 30.97	5399 8.49	63590 100.00

Table 39. EOC ALG1 Crosstab between Overall PL and Claim PL, Form B

Table of PL_MA by ObjPL_PAR				
PL_MA(Math - Achievement Level)	ObjPL_PAR(Patterning & Algebraic Reasoning)			
Frequency Percent	1	2	3	Total
1	12903 24.75	951 1.82	13 0.02	13867 26.60
2	9946 19.08	5121 9.82	356 0.68	15423 29.58
3	3083 5.91	9006 17.27	2698 5.17	14787 28.36
4	79 0.15	2331 4.47	5654 10.84	8064 15.47
Total	26011 49.89	17409 33.39	8721 16.73	52141 100.00

Table 40. EOC ALG1 Crosstab between Overall PL and Claim PL, Form B

Table of PL_MA by ObjPL_DSR				
PL_MA(Math - Achievement Level)	ObjPL_DSR(Data & Statistical Reasoning)			
Frequency Percent	1	2	3	Total
1	13577 26.04	290 0.56	0 0.00	13867 26.60
2	11576 22.20	3697 7.09	150 0.29	15423 29.58
3	4302 8.25	8824 16.92	1661 3.19	14787 28.36
4	165 0.32	3782 7.25	4117 7.90	8064 15.47
Total	29620 56.81	16593 31.82	5928 11.37	52141 100.00

Table 41. EOC ALG1 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_FGR7				
PL_MA(Math - Achievement Level)	ObjPL_FGR7			
Frequency Percent	1	2	3	Total
1	19535 30.72	319 0.50	0 0.00	19854 31.22
2	14557 22.89	5902 9.28	286 0.45	20745 32.62
3	1388 2.18	7942 12.49	6943 10.92	16273 25.59
4	0 0.00	60 0.09	6658 10.47	6718 10.56
Total	35480 55.79	14223 22.37	13887 21.84	63590 100.00

Table 42. EOC ALG1 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_FGR9				
PL_MA(Math - Achievement Level)	ObjPL_FGR9			
Frequency Percent	1	2	3	Total
1	19735 31.03	118 0.19	1 0.00	19854 31.22
2	15487 24.35	4902 7.71	356 0.56	20745 32.62
3	2421 3.81	9756 15.34	4096 6.44	16273 25.59
4	38 0.06	1884 2.96	4796 7.54	6718 10.56
Total	37681 59.26	16660 26.20	9249 14.54	63590 100.00

Table 43. EOC ALG1 Crosstab between Overall PL and Target PL, Form A

Table of PL_MA by ObjPL_DSR10				
PL_MA(Math - Achievement Level)	ObjPL_DSR10			
Frequency Percent	1	2	3	Total
1	19283 30.32	569 0.89	2 0.00	19854 31.22
2	14972 23.54	5544 8.72	229 0.36	20745 32.62
3	4096 6.44	10225 16.08	1952 3.07	16273 25.59
4	145 0.23	3357 5.28	3216 5.06	6718 10.56
Total	38496 60.54	19695 30.97	5399 8.49	63590 100.00

Table 44. EOC ALG1 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_FGR7				
PL_MA(Math - Achievement Level)	ObjPL_FGR7			
Frequency Percent	1	2	3	Total
1	13653 26.18	206 0.40	8 0.02	13867 26.60
2	9505 18.23	4036 7.74	1882 3.61	15423 29.58
3	1071 2.05	2891 5.54	10825 20.76	14787 28.36
4	0 0.00	6 0.01	8058 15.45	8064 15.47
Total	24229 46.47	7139 13.69	20773 39.84	52141 100.00

Table 45. EOC ALG1 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_FGR9				
PL_MA(Math - Achievement Level)	ObjPL_FGR9			
Frequency Percent	1	2	3	Total
1	13570 26.03	271 0.52	26 0.05	13867 26.60
2	12404 23.79	2498 4.79	521 1.00	15423 29.58
3	5522 10.59	5468 10.49	3797 7.28	14787 28.36
4	332 0.64	1819 3.49	5913 11.34	8064 15.47
Total	31828 61.04	10056 19.29	10257 19.67	52141 100.00

Table 46. EOC ALG1 Crosstab between Overall PL and Target PL, Form B

Table of PL_MA by ObjPL_DSR10				
PL_MA(Math - Achievement Level)	ObjPL_DSR10			
Frequency Percent	1	2	3	Total
1	13577 26.04	290 0.56	0 0.00	13867 26.60
2	11576 22.20	3697 7.09	150 0.29	15423 29.58
3	4302 8.25	8824 16.92	1661 3.19	14787 28.36
4	165 0.32	3782 7.25	4117 7.90	8064 15.47
Total	29620 56.81	16593 31.82	5928 11.37	52141 100.00

Table 47. EOG Mathematics Grade 6 Claim/Target Reliability and SEM

Form	Claim	Target	# of Items	Max Score Points	Raw Score Mean	Raw Score SD	Reliability Estimate	SEM
A	Numerical Reasoning		23	27	13.1	6.0	0.86	2.2
A		NR2	8	10	3.9	2.6	0.75	1.3
A		NR3	6	6	3.7	1.6	0.62	1.0
A		NR4	7	9	4.5	2.1	0.61	1.3
A	Patterning & Algebraic Reasoning		16	19	11.1	4.7	0.85	1.8
A		PAR6	8	9	4.9	2.3	0.71	1.2
A		PAR8	5	6	3.6	1.8	0.63	1.1
B	Numerical Reasoning		23	29	14.2	6.6	0.87	2.4
B		NR2	8	10	4.2	2.4	0.69	1.3
B		NR3	6	7	4.3	2.0	0.70	1.1
B		NR4	7	10	4.7	2.6	0.68	1.5
B	Patterning & Algebraic Reasoning		18	20	12.3	4.5	0.83	1.8
B		PAR6	9	10	5.9	2.6	0.75	1.3
B		PAR8	6	7	4.3	1.6	0.56	1.1

Table 48. EOC ALG1 Claim/Target Reliability and SEM

Form	Claim	Target	# of Items	Max Score Points	Raw Score Mean	Raw Score SD	Reliability Estimate	SEM
A	Data & Statistical Reasoning	DSR10	6	8	4.8	2.0	0.57	1.3
	Functional & Graphical Reasoning		21	25	12.2	5.9	0.85	2.3
		FGR7	12	15	6.5	3.6	0.75	1.8
		FGR9	7	8	4.7	2.3	0.68	1.3
B	Data & Statistical Reasoning	DSR10	6	8	4.9	2.1	0.60	1.3
	Functional & Graphical Reasoning		24	28	16.1	6.5	0.88	2.3
		FGR7	12	16	8.2	4.2	0.83	1.8
		FGR9	7	7	4.7	1.8	0.61	1.1

Linking Beacon and Giftedness Data

Linking BEACON and GA Giftedness Data

The current study was conducted to re-examine the relationship between the Georgia Beacon Assessments and GA giftedness data in grades 3 through 8 in Reading and Mathematics for 2022 data.

Linking Study Methodology

Data for the linking study were gathered from four test administrations: 1) Beacon Fall 2021 (August – November), 2) Beacon Winter 2021 (December – February), 3) Spring Beacon 2022, (March – May) and 4) Spring Georgia Milestones 2022. In addition, the GTIDs of students identified as gifted were provided by the GaDOE to create the dependent measure for a series of logistic regression analyses. Specifically, logistic regression was implemented to predict a student's probability of being identified as gifted from his BEACON score.

An initial cleaning of the data was performed prior to each logistic regression analysis. The removal of the outliers was accomplished by excluding students with percentile rank differences on BEACON and the Georgia Milestones EOG greater than 20 percentiles. Note that DRC has used similar approaches within linking analyses to establish linking results that best serve most of the score distribution. For example, within the linking study that linked the Milestones scale and the Lexile scale conducted in partnership with Metametrics, a similar data cleaning was used.

The relationship between Beacon performance and giftedness identification was implemented using data collected from the three test windows defined for Beacon (i.e., fall, winter, spring) for grades three through eight in Reading and Mathematics. Two sets of data were built for each of the 36 grade/subject/season combinations. First, the original BEACON data based on students who had been administered Beacon in each season throughout the year were used. Second, resampled data that were representative of the state in terms of achievement, gender, ethnicity, SWD, locale and giftedness were used within the analyses.

A receiver operating characteristic curve (ROC) was produced for each grade/subject/season. The corresponding "Area under the ROC Curve." (AUC) was calculated. The AUC ranges in value from 0 to 1. A model whose predictions are 100% wrong has an AUC of 0.0; one whose predictions are 100% correct has an AUC of 1.0. An AUC of 0.5 suggests no discrimination, 0.7 to 0.8 is considered acceptable, 0.8 to 0.9 is considered excellent, and more than 0.9 is considered outstanding. An optimum cut is the probability cut which gives minimum amount of mis-classification error was also identified for each grade/subject/season. The consistency Kappa associated with the optimum cut was also calculated.

Linking Results

The results were summarized in Table 1 for original BEACON data and Table 2 for the resampled data below. Across original data analyses, the Beacon scale score was an excellent predictor of being gifted with AUC values range from 0.864 to 0.903. For the resampled data analysis, the Beacon scale score was either an excellent or outstanding predictor of being gifted with AUC values range from 0.861 to 0.920. These AUC values suggest that the logistic model based on BEACON score is an effective measure in distinguishing gifted/talented students. Receiver operating characteristic (ROC) curves for all grades/seasons/subjects were also provided for both original and resampled BEACON data below. The predication accuracy among different ethnicities were compared in Tables 3-4, the results show no systematic predication differences among different races.

Caveats

The results seen within these analyses are encouraging in the Beacon results are effective as predictors within the logistic regression results. However, it is important to note that using "giftedness' within logistic regression analyses means that the relationship uses data collected from a smaller sample of higher achieving students from a much larger score distribution. Moreover, giftedness identification is determined using a wide variety of criteria. We can expect that Beacon will continue to provide an effective signal for identifying students who might benefit from additional testing. We can also anticipate that the specific result will vary throughout the year and across years.

Table 1: Results of Original BEACON data

Subject	Grade	Season	AUC	Optimal Cut	BEACON Cut	Kappa between Predicted PL and true PL	True Positive	True Negative	False Positive	False Negative
Reading	3	Fall	0.871	0.58	586	0.15	0.01	0.89	0.01	0.09
Reading	3	Winter	0.865	0.58	625	0.15	0.01	0.90	0.01	0.08
Reading	3	Spring	0.878	0.46	574	0.32	0.03	0.86	0.02	0.08
Reading	4	Fall	0.874	0.46	582	0.33	0.04	0.84	0.03	0.09
Reading	4	Winter	0.865	0.53	620	0.26	0.03	0.85	0.02	0.10
Reading	4	Spring	0.87	0.41	592	0.37	0.04	0.84	0.03	0.08
Reading	5	Fall	0.883	0.44	601	0.38	0.05	0.82	0.04	0.09
Reading	5	Winter	0.879	0.48	636	0.33	0.04	0.84	0.03	0.10
Reading	5	Spring	0.88	0.53	647	0.33	0.04	0.84	0.02	0.10
Reading	6	Fall	0.878	0.56	652	0.28	0.03	0.84	0.02	0.11
Reading	6	Winter	0.87	0.52	671	0.27	0.03	0.85	0.02	0.10
Reading	6	Spring	0.879	0.49	653	0.34	0.04	0.83	0.03	0.10
Reading	7	Fall	0.869	0.52	750	0.24	0.03	0.85	0.02	0.10
Reading	7	Winter	0.864	0.65	821	0.14	0.01	0.87	0.01	0.10
Reading	7	Spring	0.882	0.50	731	0.34	0.04	0.84	0.03	0.09
Reading	8	Fall	0.866	0.54	801	0.24	0.03	0.85	0.02	0.10
Reading	8	Winter	0.865	0.68	881	0.12	0.01	0.87	0.01	0.11
Reading	8	Spring	0.886	0.57	799	0.32	0.03	0.85	0.02	0.09
Mathematics	3	Fall	0.891	0.41	421	0.43	0.04	0.88	0.02	0.06
Mathematics	3	Winter	0.901	0.43	462	0.36	0.03	0.90	0.02	0.06
Mathematics	3	Spring	0.886	0.48	504	0.28	0.02	0.90	0.01	0.07
Mathematics	4	Fall	0.901	0.57	472	0.43	0.05	0.84	0.02	0.09
Mathematics	4	Winter	0.895	0.58	511	0.40	0.04	0.86	0.01	0.09
Mathematics	4	Spring	0.873	0.54	564	0.35	0.03	0.87	0.01	0.09
Mathematics	5	Fall	0.9	0.57	523	0.45	0.06	0.83	0.02	0.09
Mathematics	5	Winter	0.899	0.49	552	0.46	0.06	0.84	0.03	0.08
Mathematics	5	Spring	0.883	0.52	602	0.39	0.04	0.85	0.02	0.09
Mathematics	6	Fall	0.888	0.59	556	0.37	0.04	0.84	0.02	0.10
Mathematics	6	Winter	0.897	0.47	577	0.44	0.05	0.84	0.03	0.08
Mathematics	6	Spring	0.889	0.43	610	0.43	0.05	0.83	0.03	0.08
Mathematics	7	Fall	0.888	0.36	578	0.49	0.08	0.80	0.05	0.07
Mathematics	7	Winter	0.894	0.56	636	0.39	0.04	0.84	0.02	0.09
Mathematics	7	Spring	0.903	0.52	701	0.44	0.05	0.84	0.02	0.09
Mathematics	8	Fall	0.88	0.47	659	0.38	0.04	0.85	0.02	0.09
Mathematics	8	Winter	0.879	0.50	725	0.32	0.04	0.84	0.02	0.10
Mathematics	8	Spring	0.883	0.53	793	0.36	0.04	0.86	0.02	0.09

Table 2: Results of Resampled BEACON data

Subject	Grade	Season	AUC	Optimal Cut	BEACON Cut	Kappa between Predicted PL and true PL	True Positive	True Negative	False Positive	False Negative
Reading	3	Fall	0.905	0.51	526	0.41	0.04	0.87	0.02	0.07
Reading	3	Winter	0.883	0.44	547	0.37	0.04	0.86	0.03	0.08
Reading	3	Spring	0.881	0.46	578	0.32	0.03	0.88	0.02	0.07
Reading	4	Fall	0.891	0.45	570	0.38	0.04	0.85	0.03	0.08
Reading	4	Winter	0.889	0.34	556	0.49	0.07	0.82	0.05	0.06
Reading	4	Spring	0.881	0.59	646	0.22	0.02	0.88	0.01	0.09
Reading	5	Fall	0.904	0.45	589	0.45	0.06	0.84	0.03	0.08
Reading	5	Winter	0.898	0.36	594	0.49	0.07	0.82	0.04	0.07
Reading	5	Spring	0.892	0.44	637	0.38	0.04	0.85	0.03	0.08
Reading	6	Fall	0.891	0.46	612	0.40	0.04	0.85	0.02	0.08
Reading	6	Winter	0.861	0.54	650	0.32	0.04	0.84	0.02	0.11
Reading	6	Spring	0.885	0.44	639	0.39	0.04	0.85	0.03	0.08
Reading	7	Fall	0.886	0.52	713	0.32	0.03	0.85	0.02	0.09
Reading	7	Winter	0.879	0.57	737	0.30	0.03	0.84	0.02	0.11
Reading	7	Spring	0.866	0.52	748	0.28	0.03	0.84	0.02	0.10
Reading	8	Fall	0.874	0.50	742	0.38	0.04	0.84	0.02	0.09
Reading	8	Winter	0.882	0.35	700	0.45	0.07	0.80	0.05	0.07
Reading	8	Spring	0.891	0.46	762	0.44	0.05	0.84	0.03	0.08
Mathematics	3	Fall	0.893	0.37	414	0.46	0.05	0.85	0.03	0.06
Mathematics	3	Winter	0.904	0.37	449	0.48	0.05	0.86	0.03	0.06
Mathematics	3	Spring	0.886	0.76	538	0.25	0.02	0.89	0.00	0.09
Mathematics	4	Fall	0.885	0.47	478	0.43	0.05	0.85	0.02	0.08
Mathematics	4	Winter	0.92	0.52	507	0.55	0.08	0.82	0.02	0.08
Mathematics	4	Spring	0.912	0.41	532	0.52	0.06	0.85	0.03	0.06
Mathematics	5	Fall	0.91	0.55	526	0.47	0.05	0.85	0.02	0.08
Mathematics	5	Winter	0.914	0.50	555	0.53	0.07	0.82	0.03	0.08
Mathematics	5	Spring	0.898	0.46	589	0.49	0.06	0.84	0.02	0.07
Mathematics	6	Fall	0.899	0.60	568	0.42	0.04	0.86	0.01	0.08
Mathematics	6	Winter	0.897	0.56	621	0.41	0.04	0.86	0.01	0.09
Mathematics	6	Spring	0.89	0.47	603	0.44	0.05	0.84	0.03	0.08
Mathematics	7	Fall	0.897	0.43	583	0.50	0.07	0.82	0.04	0.07
Mathematics	7	Winter	0.886	0.47	639	0.40	0.05	0.84	0.03	0.09
Mathematics	7	Spring	0.899	0.49	662	0.48	0.06	0.84	0.03	0.08
Mathematics	8	Fall	0.872	0.43	658	0.41	0.04	0.87	0.02	0.07
Mathematics	8	Winter	0.896	0.61	748	0.30	0.03	0.85	0.02	0.10
Mathematics	8	Spring	0.864	0.39	706	0.45	0.05	0.84	0.03	0.07

Table 3: Prediction Comparison among Ethnicities for Reading

Content	Grade	Season	Ethnicity	True Positive	True Negative	False Positive	False Negative	N
Reading	3	Fall	All	3%	87%	2%	8%	138030
Reading	3	Fall	White	5%	81%	2%	11%	50386
Reading	3	Fall	Black	1%	93%	1%	5%	51014
Reading	3	Fall	Hispanic	1%	93%	1%	5%	23816
Reading	3	Fall	Others	8%	73%	5%	13%	12814
Reading	3	Winter	All	2%	87%	1%	9%	138030
Reading	3	Winter	White	4%	81%	2%	13%	51506
Reading	3	Winter	Black	1%	94%	1%	5%	48737
Reading	3	Winter	Hispanic	1%	92%	0%	7%	25022
Reading	3	Winter	Others	8%	76%	2%	14%	12765
Reading	3	Spring	All	4%	86%	3%	7%	138030
Reading	3	Spring	White	6%	78%	5%	10%	50267
Reading	3	Spring	Black	2%	93%	1%	4%	50912
Reading	3	Spring	Hispanic	2%	92%	2%	5%	23911
Reading	3	Spring	Others	10%	77%	5%	8%	12940
Reading	4	Fall	All	4%	84%	3%	9%	142880
Reading	4	Fall	White	7%	76%	5%	12%	52507
Reading	4	Fall	Black	1%	93%	1%	5%	51679
Reading	4	Fall	Hispanic	3%	91%	2%	5%	26050
Reading	4	Fall	Others	12%	68%	5%	15%	12644
Reading	4	Winter	All	6%	82%	4%	7%	142880
Reading	4	Winter	White	9%	76%	6%	9%	52613
Reading	4	Winter	Black	2%	90%	3%	5%	51489
Reading	4	Winter	Hispanic	3%	89%	3%	5%	25687
Reading	4	Winter	Others	13%	66%	8%	13%	13091
Reading	4	Spring	All	2%	86%	1%	10%	142880
Reading	4	Spring	White	3%	81%	1%	15%	52545
Reading	4	Spring	Black	1%	93%	0%	5%	52650
Reading	4	Spring	Hispanic	1%	93%	1%	5%	23497
Reading	4	Spring	Others	6%	70%	3%	21%	14188
Reading	5	Fall	All	7%	81%	5%	7%	144493
Reading	5	Fall	White	11%	71%	8%	9%	53067
Reading	5	Fall	Black	3%	91%	2%	5%	52883
Reading	5	Fall	Hispanic	3%	89%	4%	4%	26036
Reading	5	Fall	Others	18%	65%	9%	9%	12507
Reading	5	Winter	All	7%	81%	5%	7%	144493
Reading	5	Winter	White	11%	73%	6%	10%	53254
Reading	5	Winter	Black	4%	88%	3%	5%	53034

Content	Grade	Season	Ethnicity	True Positive	True Negative	False Positive	False Negative	N
Reading	5	Winter	Hispanic	2%	90%	3%	4%	26087
Reading	5	Winter	Others	18%	64%	7%	11%	12118
Reading	5	Spring	All	4%	84%	2%	11%	144493
Reading	5	Spring	White	6%	77%	2%	15%	52227
Reading	5	Spring	Black	1%	91%	1%	6%	54866
Reading	5	Spring	Hispanic	1%	91%	1%	7%	24210
Reading	5	Spring	Others	11%	67%	3%	20%	13190
Reading	6	Fall	All	4%	84%	3%	9%	142635
Reading	6	Fall	White	6%	77%	3%	14%	51971
Reading	6	Fall	Black	2%	92%	2%	5%	51606
Reading	6	Fall	Hispanic	2%	92%	2%	5%	26571
Reading	6	Fall	Others	11%	68%	5%	16%	12487
Reading	6	Winter	All	4%	84%	2%	9%	142635
Reading	6	Winter	White	7%	78%	2%	13%	51797
Reading	6	Winter	Black	1%	90%	2%	7%	51961
Reading	6	Winter	Hispanic	1%	93%	2%	4%	25687
Reading	6	Winter	Others	10%	71%	5%	15%	13190
Reading	6	Spring	All	5%	84%	2%	9%	142635
Reading	6	Spring	White	6%	77%	3%	13%	52012
Reading	6	Spring	Black	2%	91%	1%	6%	52334
Reading	6	Spring	Hispanic	2%	89%	2%	6%	25246
Reading	6	Spring	Others	12%	69%	4%	15%	13043
Reading	7	Fall	All	4%	83%	4%	9%	146170
Reading	7	Fall	White	7%	75%	4%	15%	52673
Reading	7	Fall	Black	1%	91%	3%	5%	54144
Reading	7	Fall	Hispanic	2%	88%	3%	7%	27943
Reading	7	Fall	Others	15%	63%	7%	15%	11410
Reading	7	Winter	All	4%	83%	2%	11%	146170
Reading	7	Winter	White	5%	76%	3%	15%	52953
Reading	7	Winter	Black	1%	91%	1%	6%	53638
Reading	7	Winter	Hispanic	2%	87%	2%	9%	26751
Reading	7	Winter	Others	11%	70%	3%	16%	12828
Reading	7	Spring	All	3%	83%	2%	11%	146170
Reading	7	Spring	White	5%	75%	4%	16%	56551
Reading	7	Spring	Black	1%	92%	1%	6%	50986
Reading	7	Spring	Hispanic	3%	91%	2%	5%	25809
Reading	7	Spring	Others	9%	71%	4%	16%	12824
Reading	8	Fall	All	3%	84%	2%	11%	150426
Reading	8	Fall	White	5%	77%	3%	15%	54140

Content	Grade	Season	Ethnicity	True Positive	True Negative	False Positive	False Negative	N
Reading	8	Fall	Black	1%	91%	1%	7%	56857
Reading	8	Fall	Hispanic	1%	90%	1%	8%	27160
Reading	8	Fall	Others	8%	68%	4%	21%	12269
Reading	8	Winter	All	3%	84%	2%	11%	150426
Reading	8	Winter	White	5%	77%	2%	16%	55963
Reading	8	Winter	Black	2%	91%	1%	6%	55446
Reading	8	Winter	Hispanic	1%	91%	2%	6%	26897
Reading	8	Winter	Others	7%	69%	2%	22%	12120
Reading	8	Spring	All	1%	87%	1%	11%	150426
Reading	8	Spring	White	2%	81%	1%	16%	56471
Reading	8	Spring	Black	0%	93%	0%	6%	55029
Reading	8	Spring	Hispanic	0%	92%	0%	8%	27807
Reading	8	Spring	Others	7%	72%	1%	20%	11119

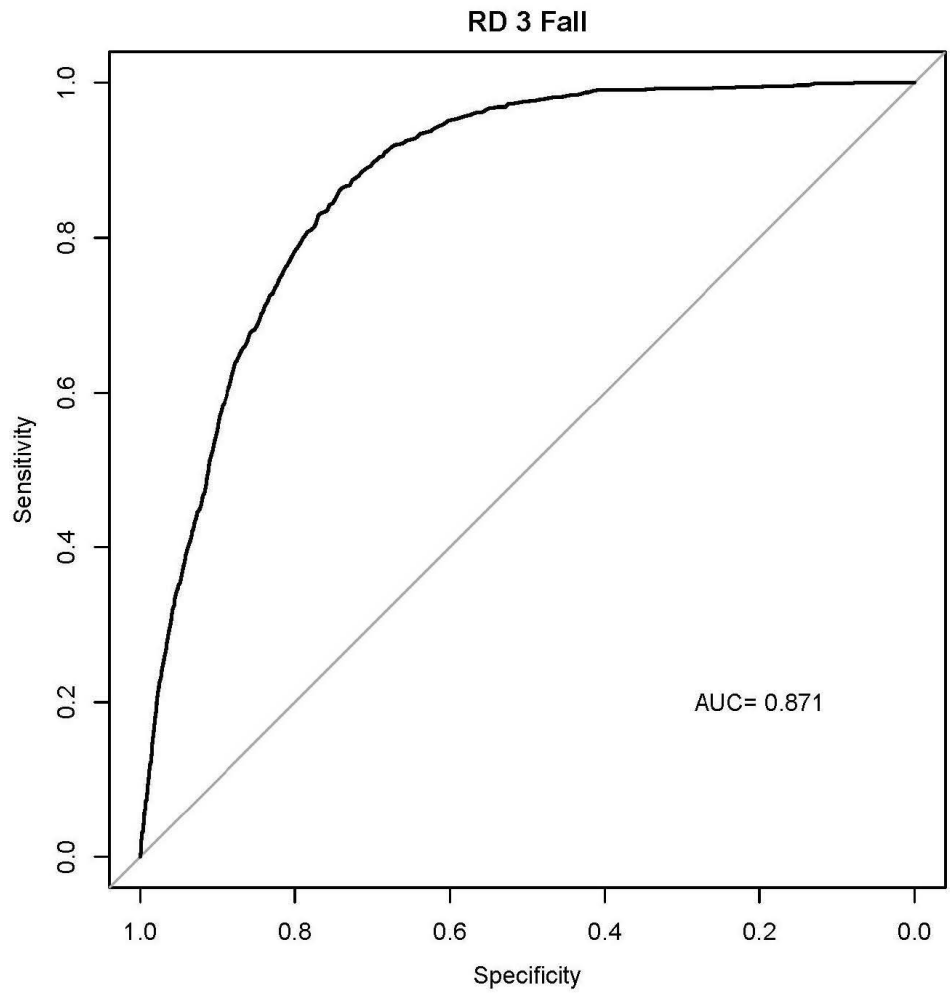
Table 4: Prediction Comparison among Ethnicities for Mathematics

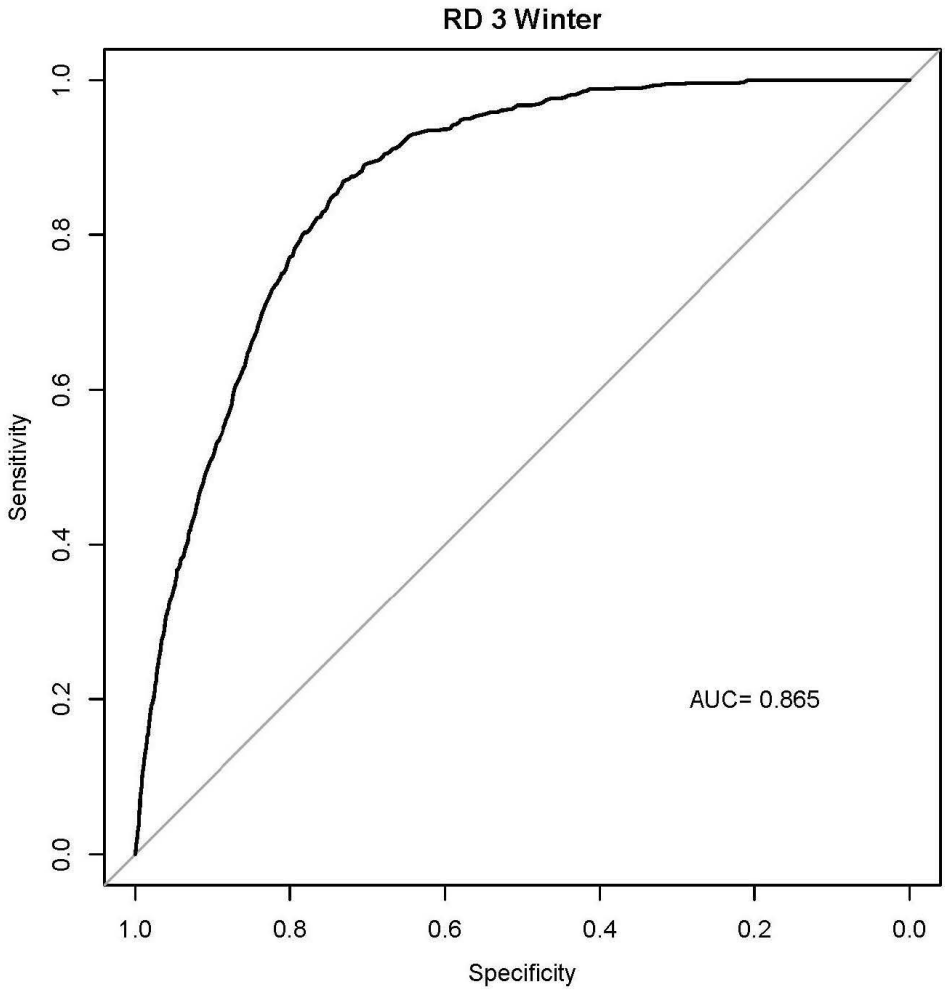
Content	Grade	Season	Ethnicity	True Positive	True Negative	False Positive	False Negative	N
Mathematics	3	Fall	All	2%	89%	1%	8%	134037
Mathematics	3	Fall	White	3%	84%	1%	13%	55627
Mathematics	3	Fall	Black	0%	96%	0%	4%	38883
Mathematics	3	Fall	Hispanic	0%	96%	0%	3%	23723
Mathematics	3	Fall	Others	10%	78%	1%	11%	15804
Mathematics	3	Winter	All	6%	86%	2%	6%	134037
Mathematics	3	Winter	White	8%	79%	3%	10%	51066
Mathematics	3	Winter	Black	1%	97%	1%	2%	48021
Mathematics	3	Winter	Hispanic	3%	89%	3%	5%	22207
Mathematics	3	Winter	Others	25%	61%	7%	6%	12743
Mathematics	3	Spring	All	5%	86%	3%	7%	134037
Mathematics	3	Spring	White	7%	79%	3%	10%	47868
Mathematics	3	Spring	Black	1%	93%	1%	5%	49916
Mathematics	3	Spring	Hispanic	2%	89%	2%	7%	24332
Mathematics	3	Spring	Others	12%	74%	8%	6%	11921
Mathematics	4	Fall	All	6%	85%	2%	8%	138987
Mathematics	4	Fall	White	8%	79%	3%	10%	56552
Mathematics	4	Fall	Black	1%	94%	1%	4%	42271
Mathematics	4	Fall	Hispanic	2%	94%	0%	4%	24927
Mathematics	4	Fall	Others	18%	62%	4%	15%	15237
Mathematics	4	Winter	All	6%	84%	2%	8%	138987

Content	Grade	Season	Ethnicity	True Positive	True Negative	False Positive	False Negative	N
Mathematics	4	Winter	White	8%	79%	3%	11%	53719
Mathematics	4	Winter	Black	1%	94%	0%	5%	52245
Mathematics	4	Winter	Hispanic	4%	85%	2%	9%	21546
Mathematics	4	Winter	Others	25%	64%	5%	6%	11477
Mathematics	4	Spring	All	4%	85%	2%	9%	138987
Mathematics	4	Spring	White	7%	77%	4%	12%	50863
Mathematics	4	Spring	Black	0%	93%	0%	6%	51143
Mathematics	4	Spring	Hispanic	4%	92%	0%	4%	23176
Mathematics	4	Spring	Others	11%	71%	4%	13%	13805
Mathematics	5	Fall	All	6%	84%	2%	9%	140866
Mathematics	5	Fall	White	7%	77%	2%	14%	59837
Mathematics	5	Fall	Black	1%	94%	0%	5%	41778
Mathematics	5	Fall	Hispanic	3%	92%	1%	4%	26233
Mathematics	5	Fall	Others	20%	68%	4%	8%	13018
Mathematics	5	Winter	All	8%	82%	3%	7%	140866
Mathematics	5	Winter	White	12%	73%	5%	10%	52718
Mathematics	5	Winter	Black	2%	92%	1%	4%	54054
Mathematics	5	Winter	Hispanic	2%	90%	2%	5%	23351
Mathematics	5	Winter	Others	22%	62%	10%	5%	10743
Mathematics	5	Spring	All	9%	81%	5%	6%	140866
Mathematics	5	Spring	White	13%	72%	7%	9%	50610
Mathematics	5	Spring	Black	4%	90%	1%	4%	54616
Mathematics	5	Spring	Hispanic	3%	87%	4%	7%	22621
Mathematics	5	Spring	Others	19%	65%	10%	5%	13019
Mathematics	6	Fall	All	5%	84%	1%	10%	138080
Mathematics	6	Fall	White	7%	77%	1%	15%	58896
Mathematics	6	Fall	Black	0%	94%	0%	6%	40203
Mathematics	6	Fall	Hispanic	3%	91%	0%	6%	25190
Mathematics	6	Fall	Others	15%	74%	2%	10%	13791
Mathematics	6	Winter	All	4%	85%	1%	9%	138080
Mathematics	6	Winter	White	7%	78%	2%	13%	52344
Mathematics	6	Winter	Black	0%	94%	0%	6%	51101
Mathematics	6	Winter	Hispanic	2%	91%	1%	6%	22105
Mathematics	6	Winter	Others	16%	64%	6%	13%	12530
Mathematics	6	Spring	All	5%	85%	3%	8%	138080
Mathematics	6	Spring	White	8%	77%	4%	12%	50265
Mathematics	6	Spring	Black	1%	94%	1%	5%	51565
Mathematics	6	Spring	Hispanic	3%	91%	2%	5%	24510
Mathematics	6	Spring	Others	12%	71%	6%	11%	11740

Content	Grade	Season	Ethnicity	True Positive	True Negative	False Positive	False Negative	N
Mathematics	7	Fall	All	7%	82%	4%	7%	142429
Mathematics	7	Fall	White	12%	73%	6%	9%	56517
Mathematics	7	Fall	Black	1%	95%	1%	3%	45555
Mathematics	7	Fall	Hispanic	2%	92%	2%	5%	26504
Mathematics	7	Fall	Others	20%	60%	9%	11%	13853
Mathematics	7	Winter	All	5%	85%	1%	9%	142429
Mathematics	7	Winter	White	7%	76%	1%	16%	53309
Mathematics	7	Winter	Black	1%	94%	0%	5%	53264
Mathematics	7	Winter	Hispanic	1%	94%	1%	4%	23748
Mathematics	7	Winter	Others	19%	64%	6%	10%	12108
Mathematics	7	Spring	All	6%	85%	2%	7%	142429
Mathematics	7	Spring	White	9%	78%	3%	11%	54282
Mathematics	7	Spring	Black	1%	94%	0%	5%	52144
Mathematics	7	Spring	Hispanic	4%	93%	1%	3%	24262
Mathematics	7	Spring	Others	19%	61%	11%	10%	11741
Mathematics	8	Fall	All	4%	86%	1%	9%	145205
Mathematics	8	Fall	White	5%	81%	1%	13%	61291
Mathematics	8	Fall	Black	1%	94%	0%	6%	43899
Mathematics	8	Fall	Hispanic	2%	95%	0%	3%	26350
Mathematics	8	Fall	Others	17%	65%	6%	12%	13665
Mathematics	8	Winter	All	7%	81%	5%	8%	145205
Mathematics	8	Winter	White	10%	71%	7%	12%	56268
Mathematics	8	Winter	Black	2%	94%	1%	3%	52215
Mathematics	8	Winter	Hispanic	2%	89%	3%	6%	25587
Mathematics	8	Winter	Others	28%	51%	12%	10%	11135
Mathematics	8	Spring	All	3%	86%	1%	9%	145205
Mathematics	8	Spring	White	6%	77%	2%	15%	53439
Mathematics	8	Spring	Black	1%	94%	0%	5%	54474
Mathematics	8	Spring	Hispanic	1%	96%	0%	3%	25054
Mathematics	8	Spring	Others	9%	72%	2%	17%	12238

ROC curves of all grades/subjects/seasons for the original data

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Sensitivity
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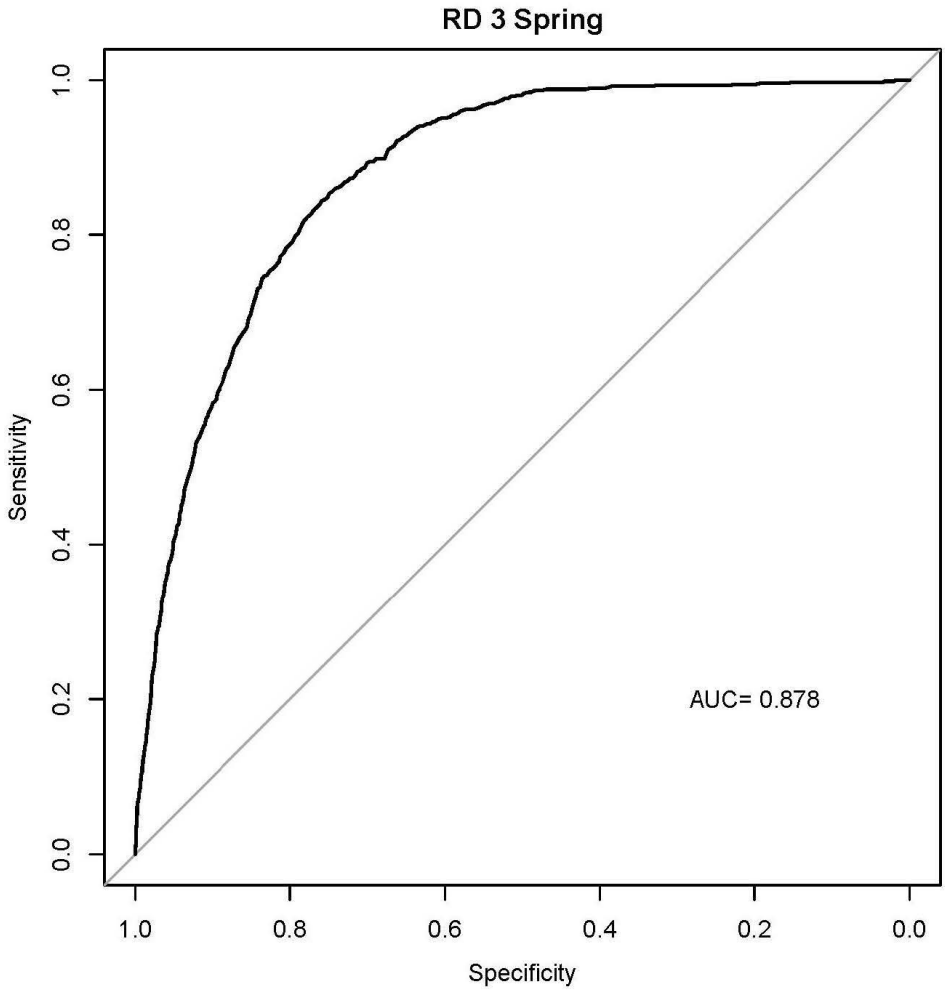
0.4
0.2
0.0
AUC= 0.865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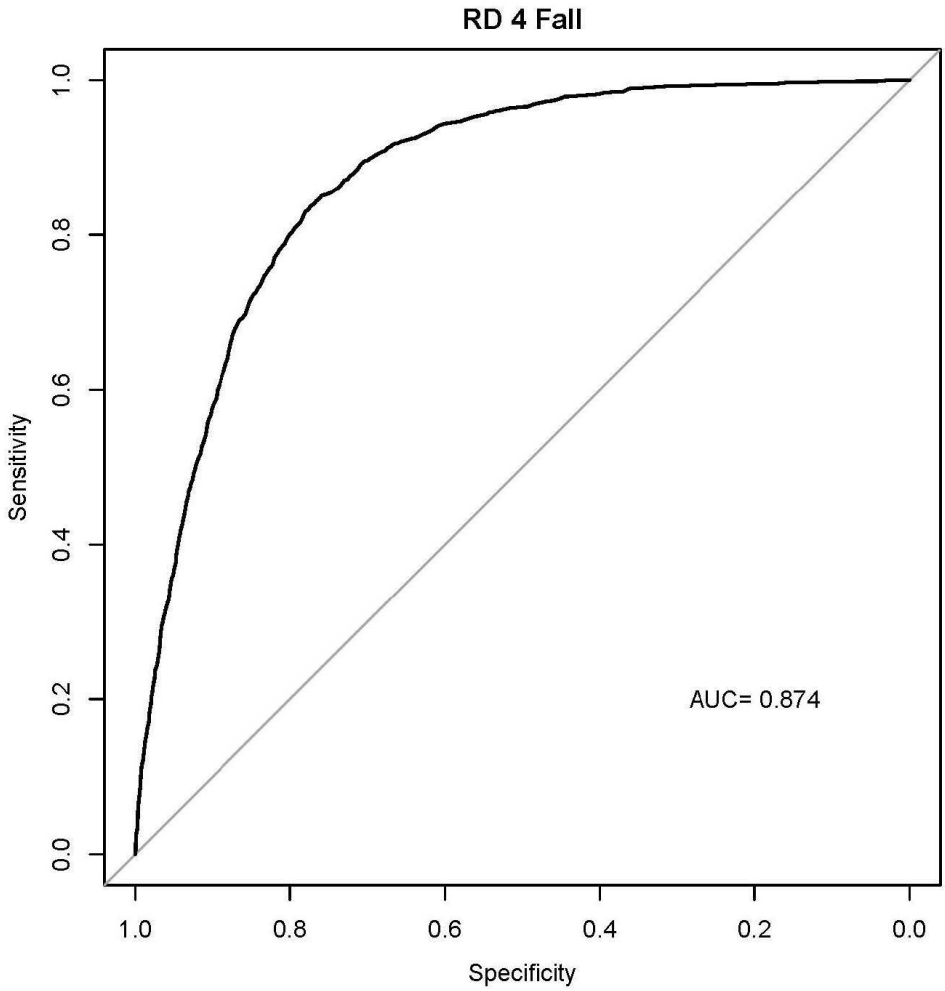
AUC= 0.878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Sensitivity
Specificity
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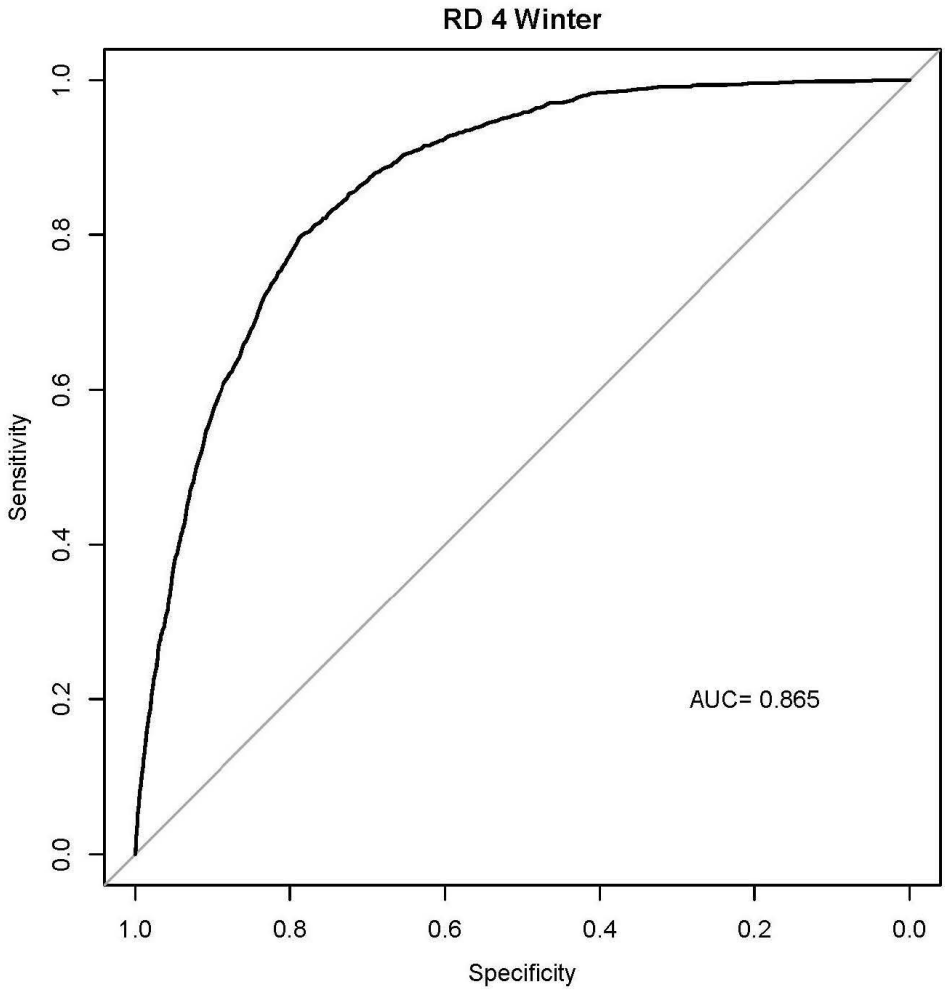
0.8
0.6
0.4
0.2
0.0
AUC= 0.874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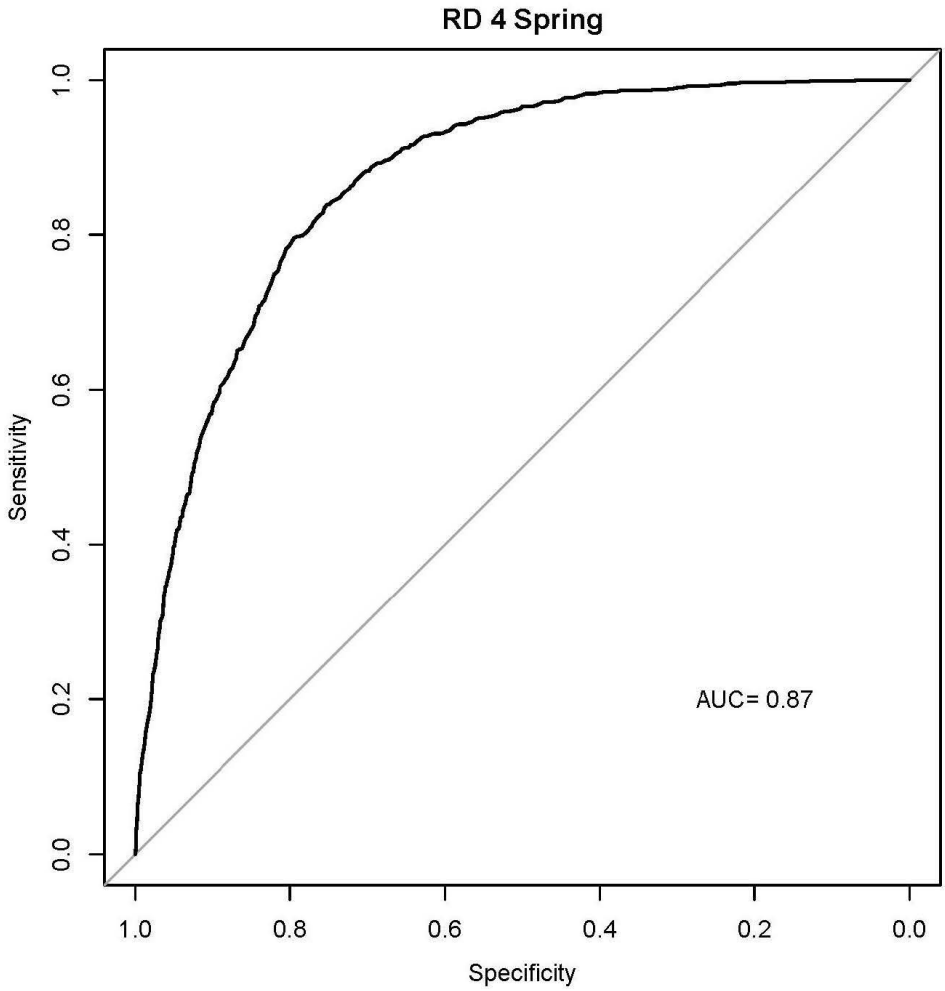
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.865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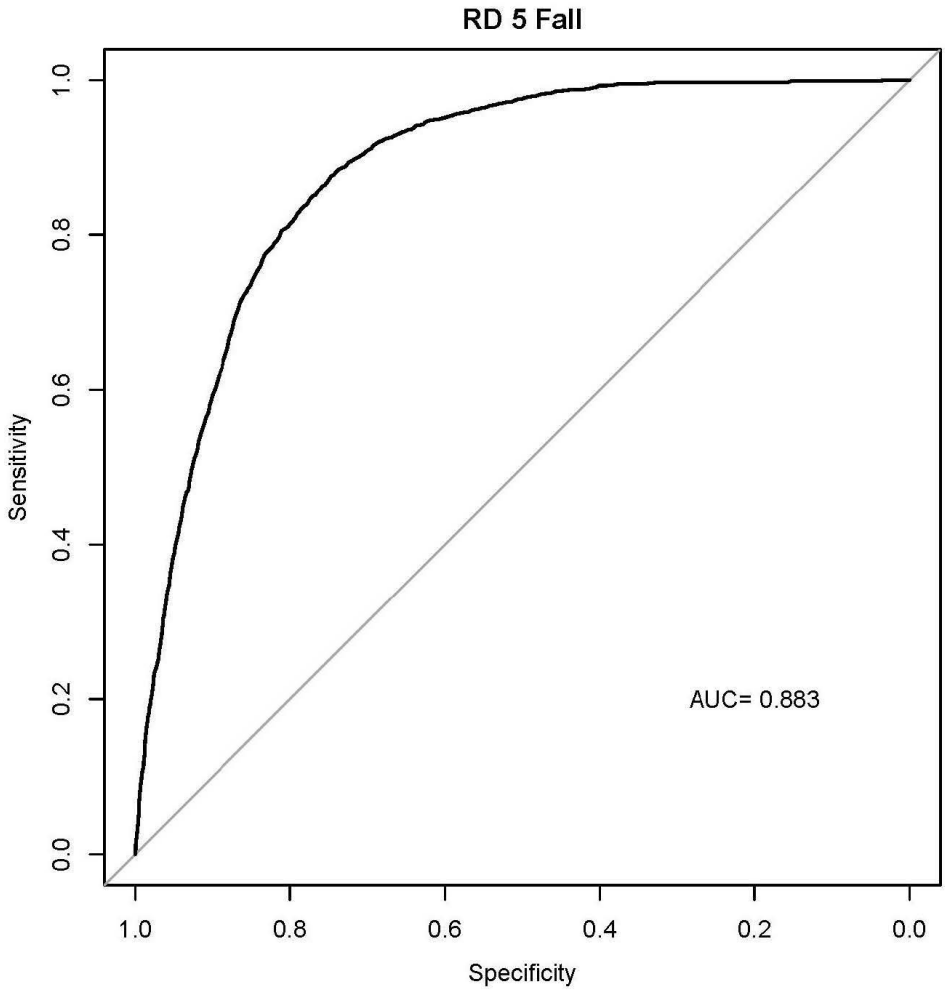
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.87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Sensitivity
Specificity
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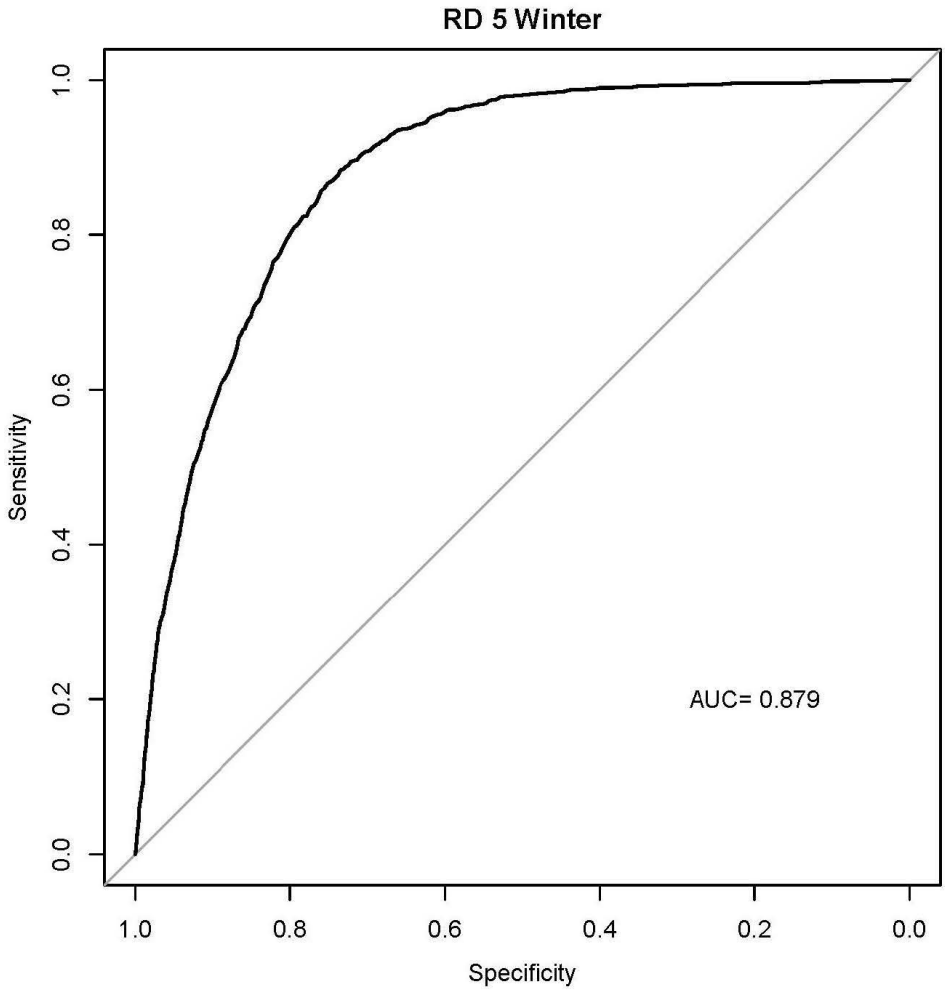
0.6
0.4
0.2
0.0
AUC= 0.883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Sensitivity
Specificity
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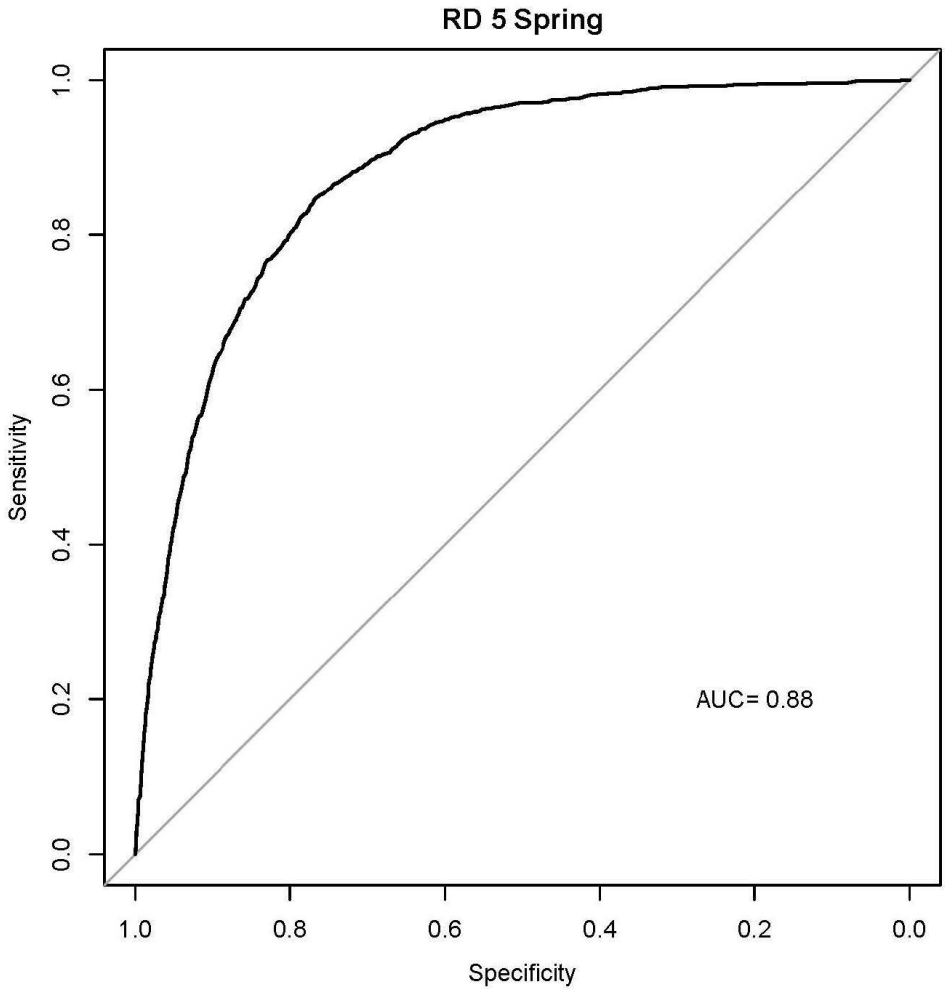
0.8
0.6
0.4
0.2
0.0
AUC= 0.879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Sensitivity
Specificity
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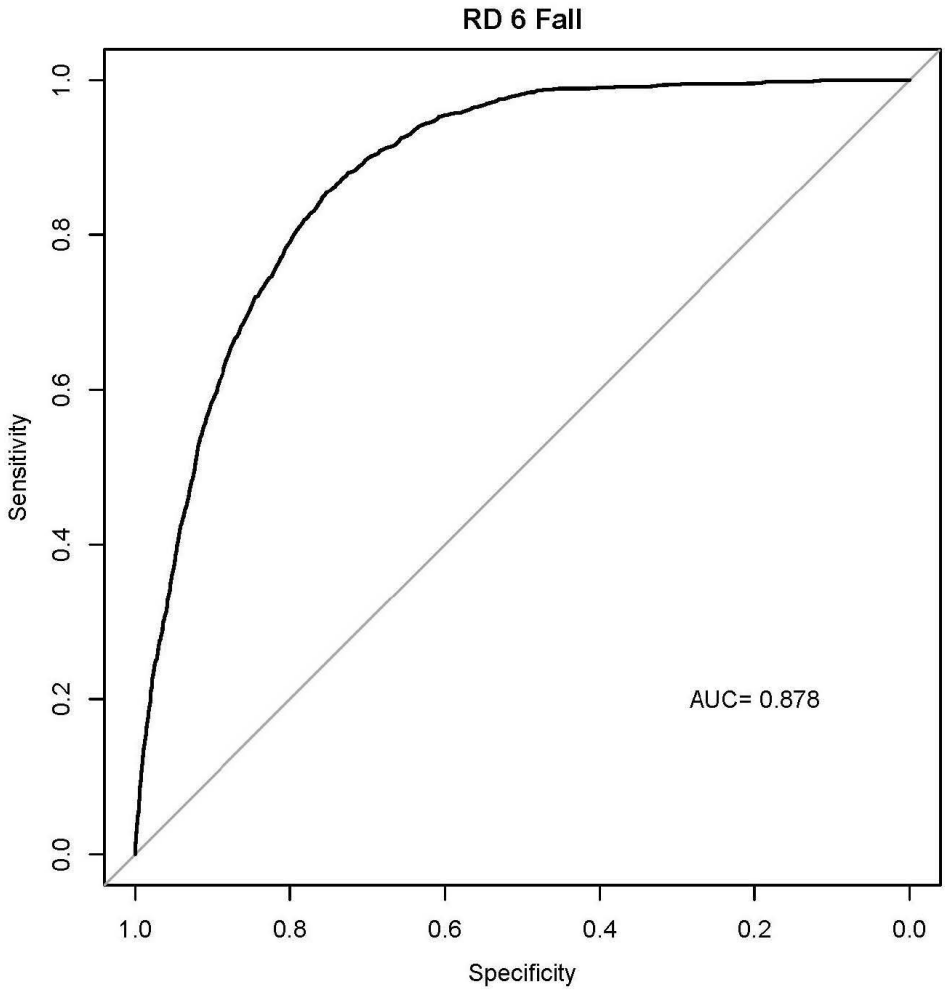
0.8
0.6
0.4
0.2
0.0
AUC= 0.88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Sensitivity
Specificity
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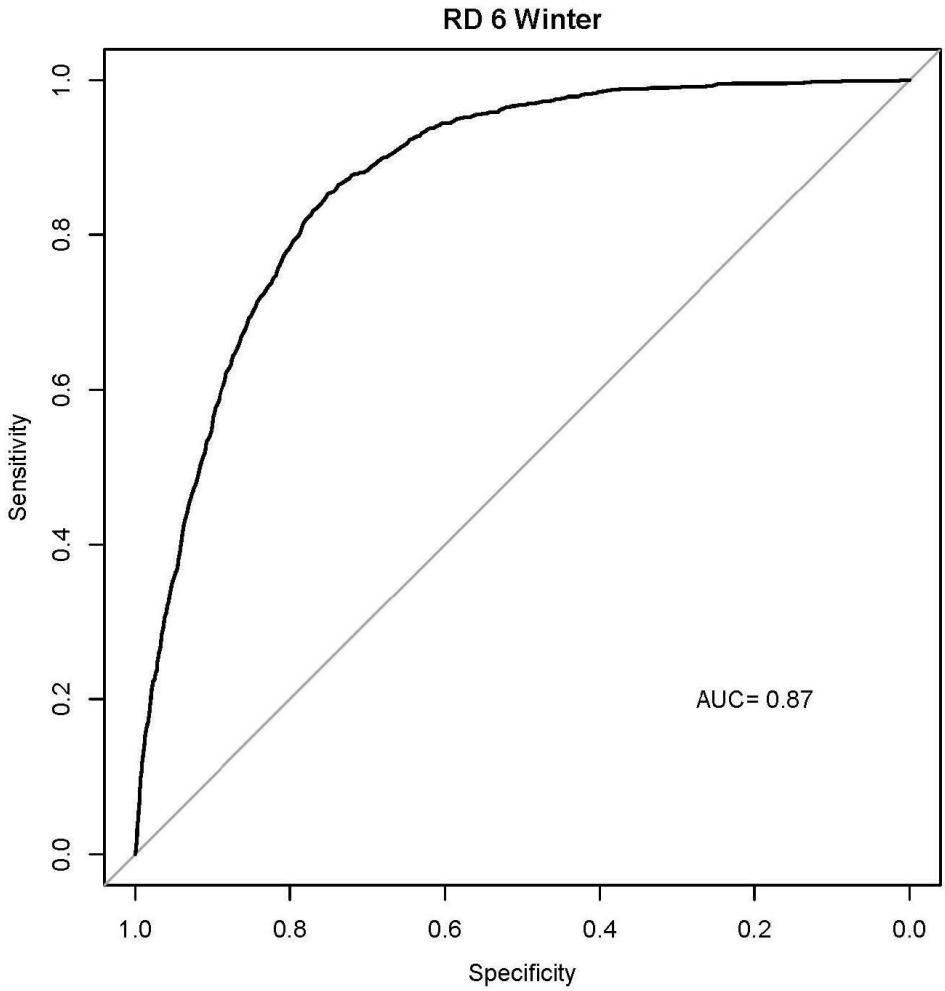
0.8
0.6
0.4
0.2
0.0
AUC= 0.878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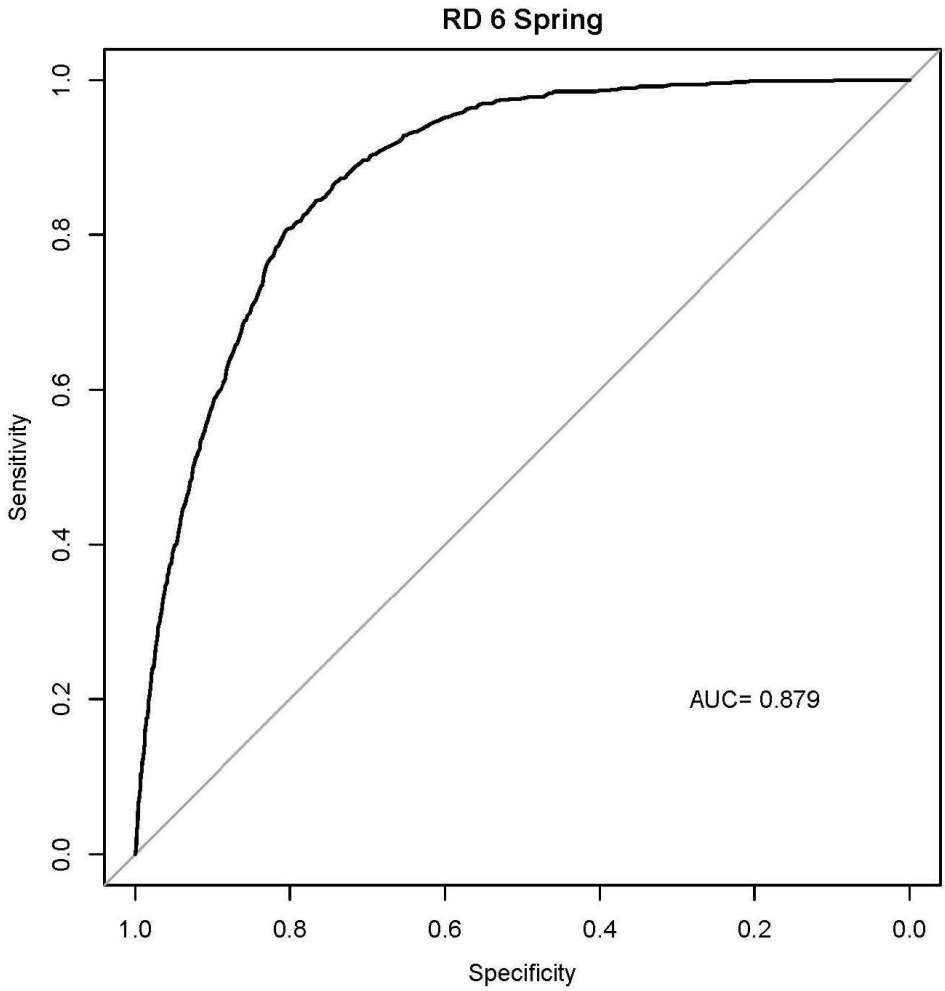
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.87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Sensitivity
Specificity
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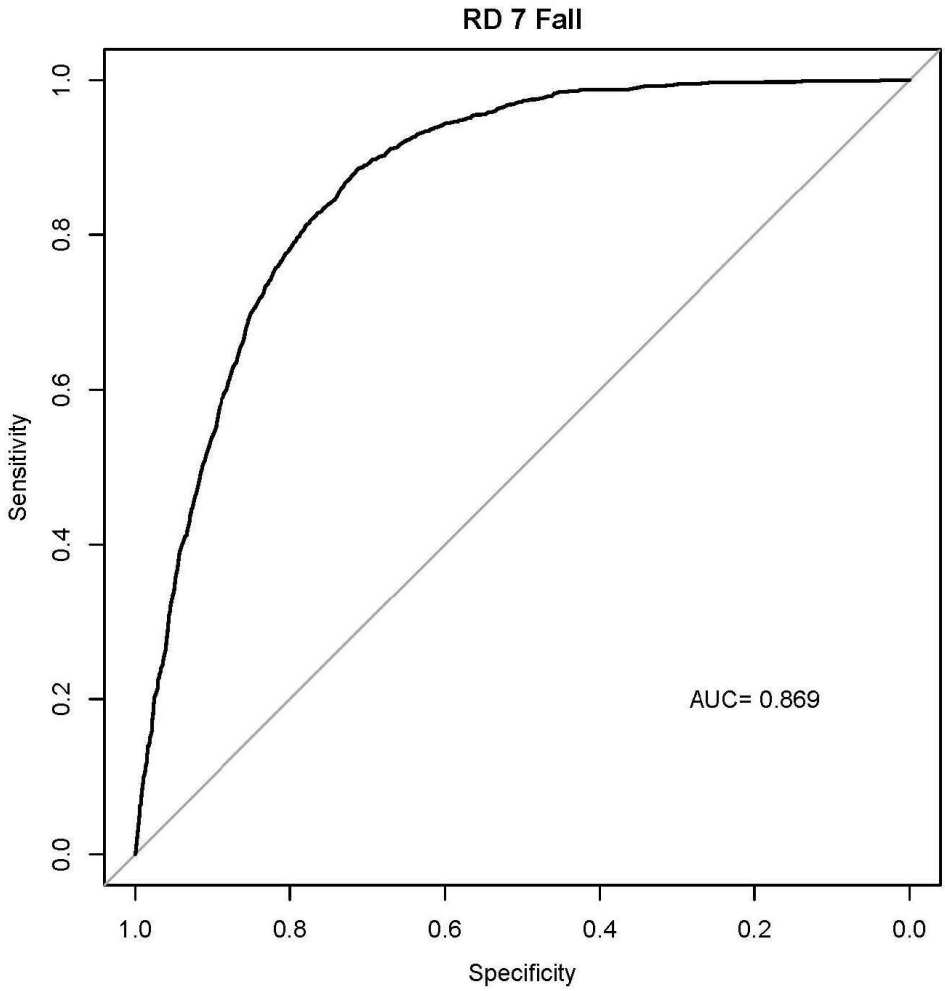
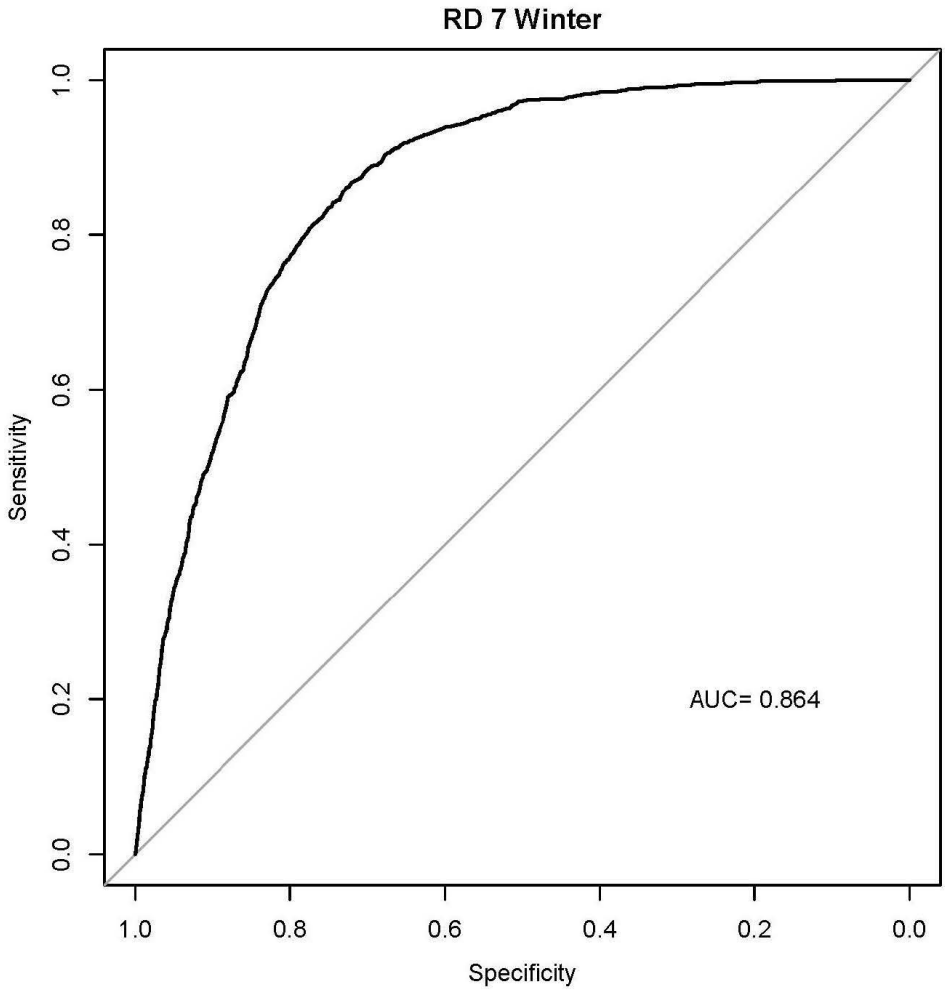
0.8
0.6
0.4
0.2
0.0
AUC= 0.879


RD 7 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.869


RD 7 Winter
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Specificity
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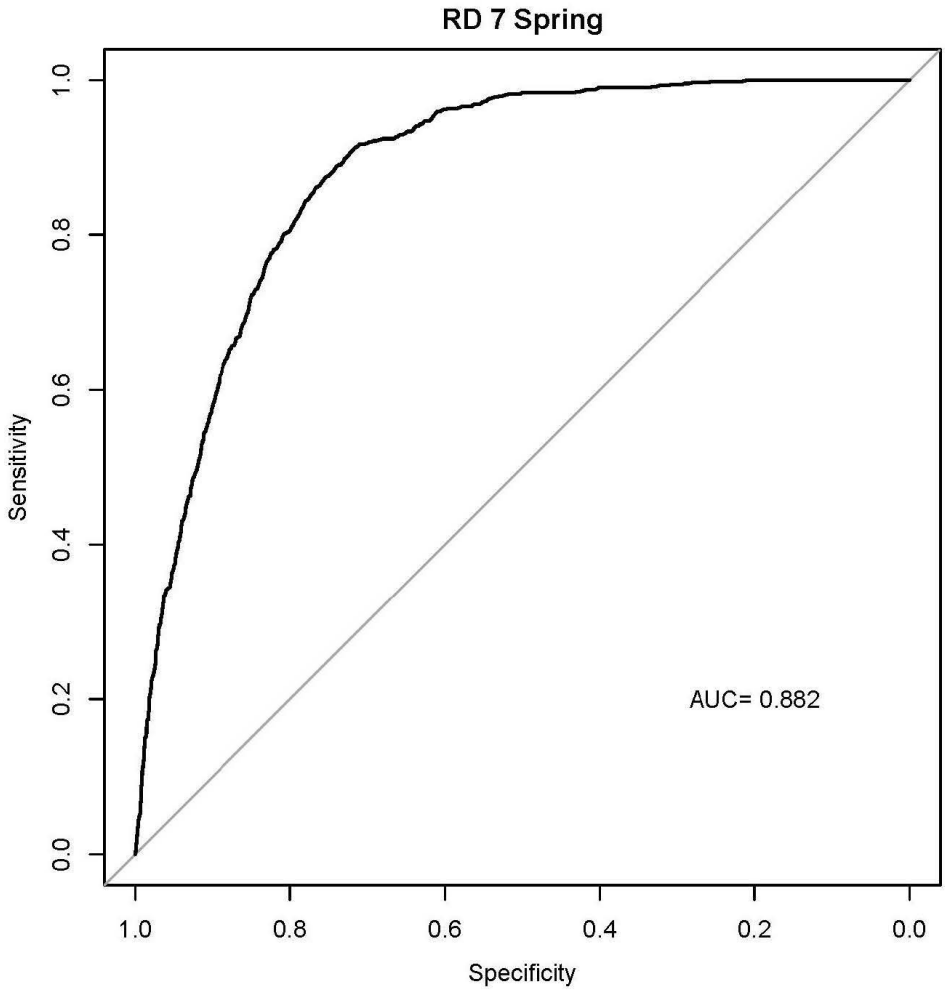
0.6
0.4
0.2
0.0
AUC= 0.864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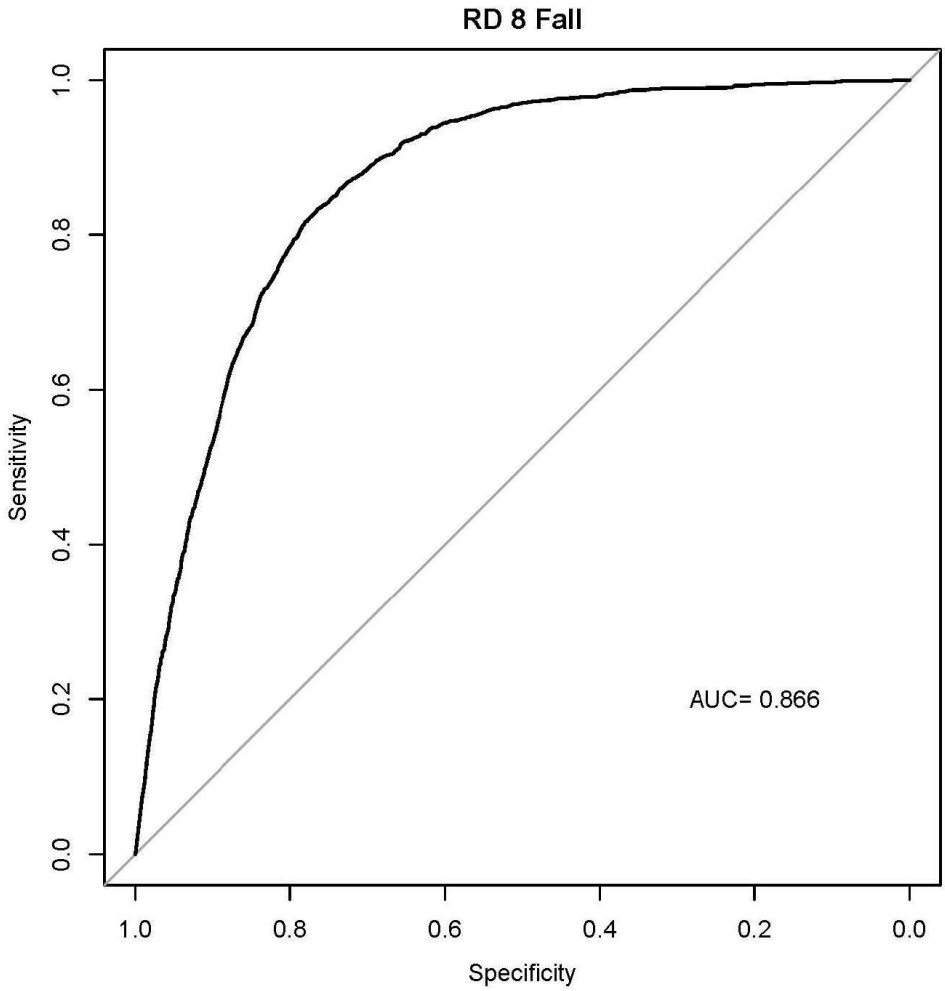
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.882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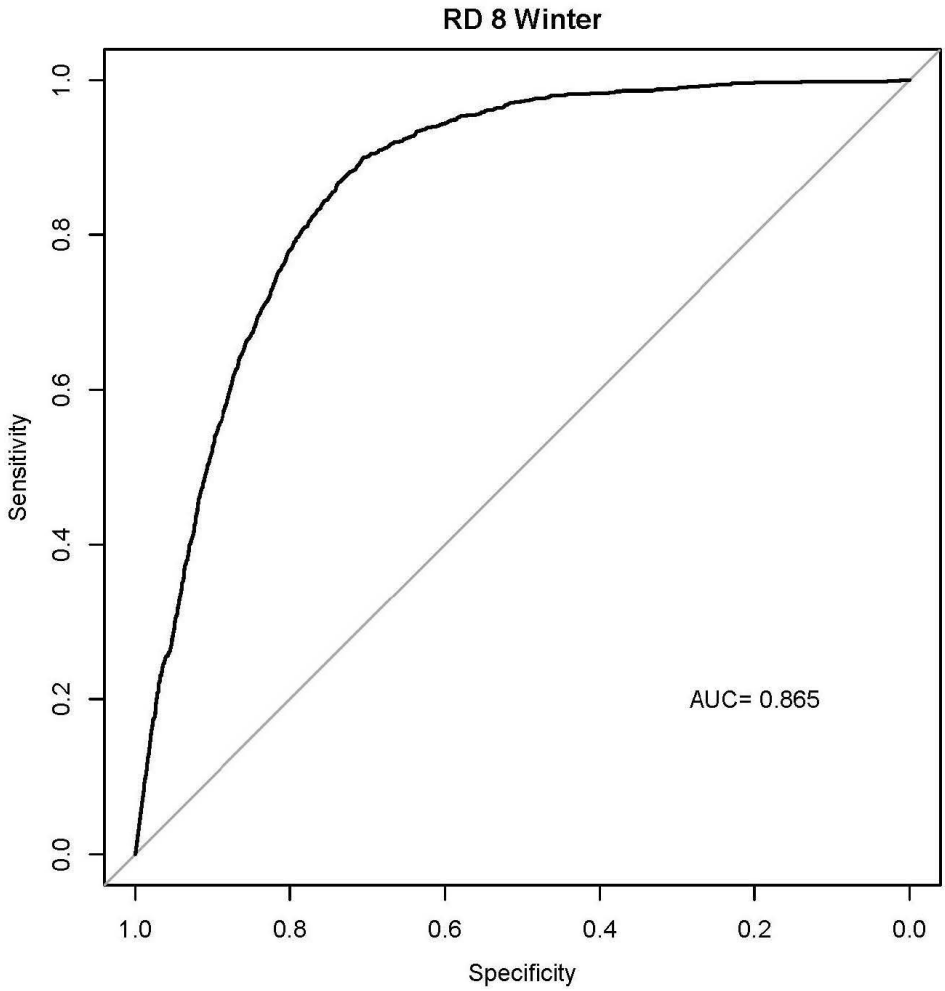
RD 8 Winter
Sensitivity
Specificity
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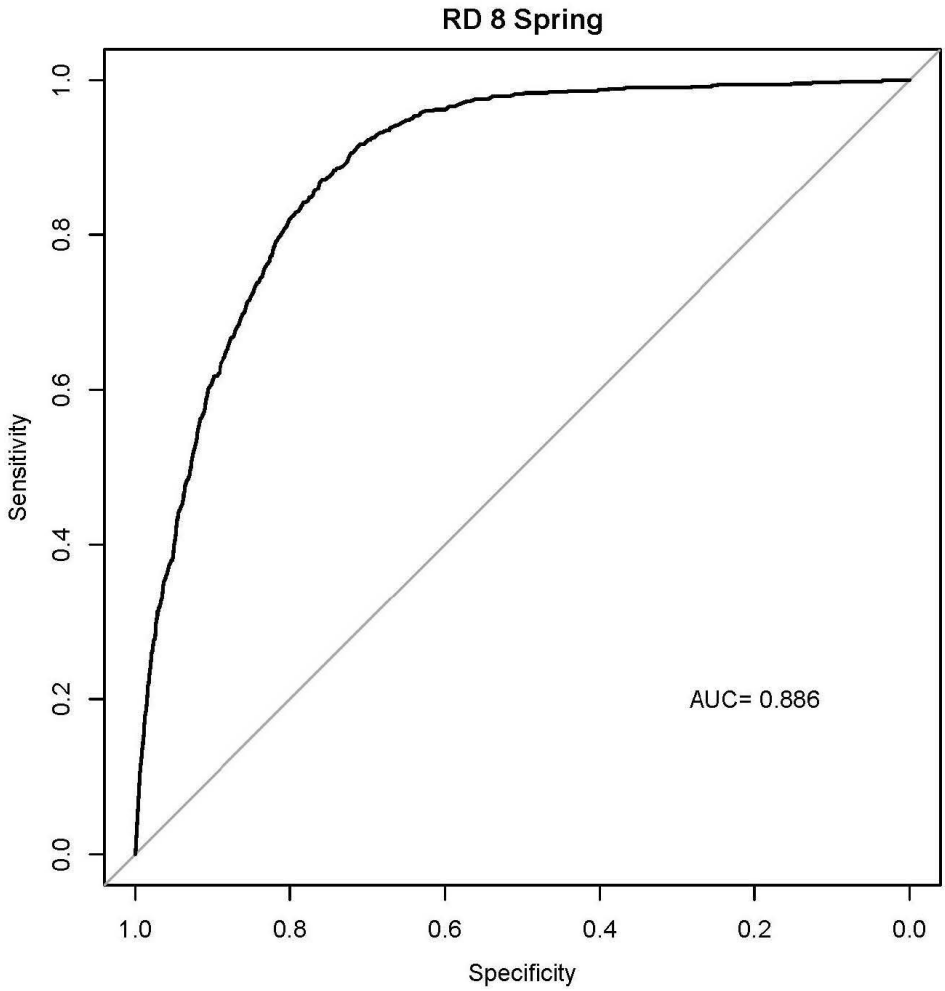
0.6
0.4
0.2
0.0
AUC= 0.865


RD 8 Spring
Sensitivity
Specificity
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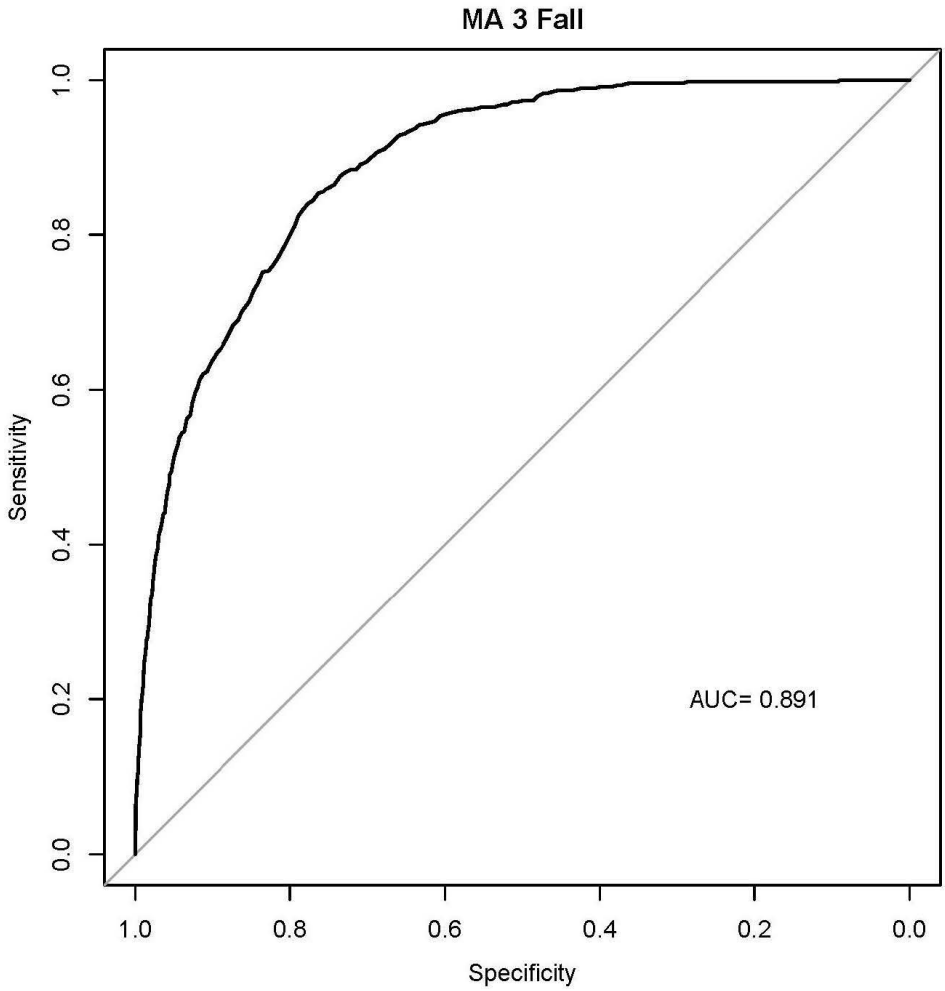
0.4
0.2
0.0
AUC= 0.886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Specificity
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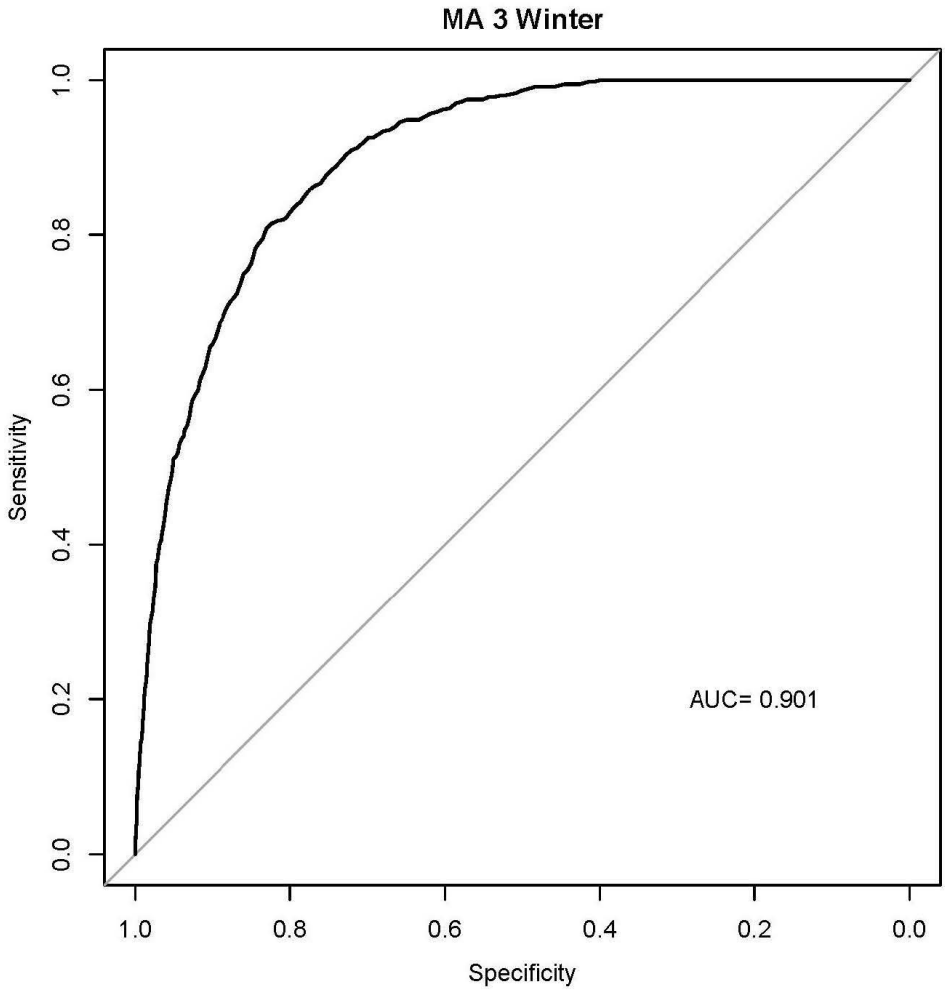
0.6
0.4
0.2
0.0
AUC= 0.891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Sensitivity
Specificity
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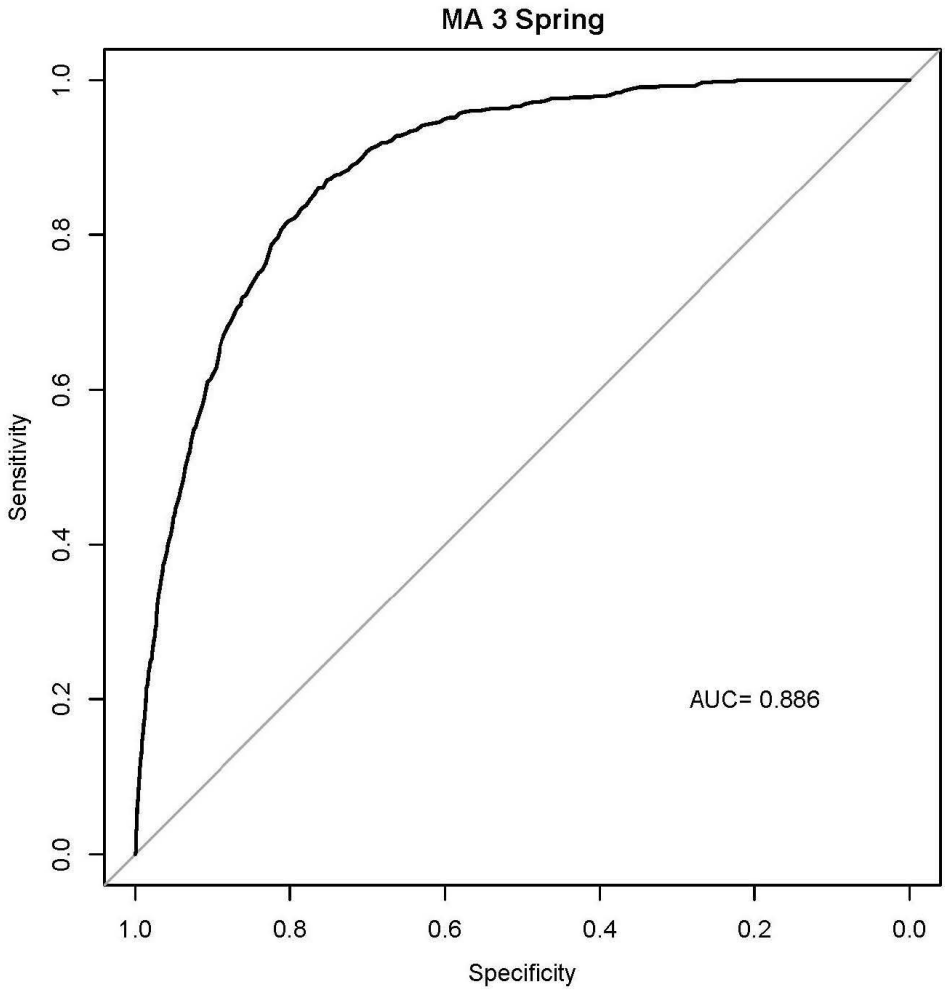
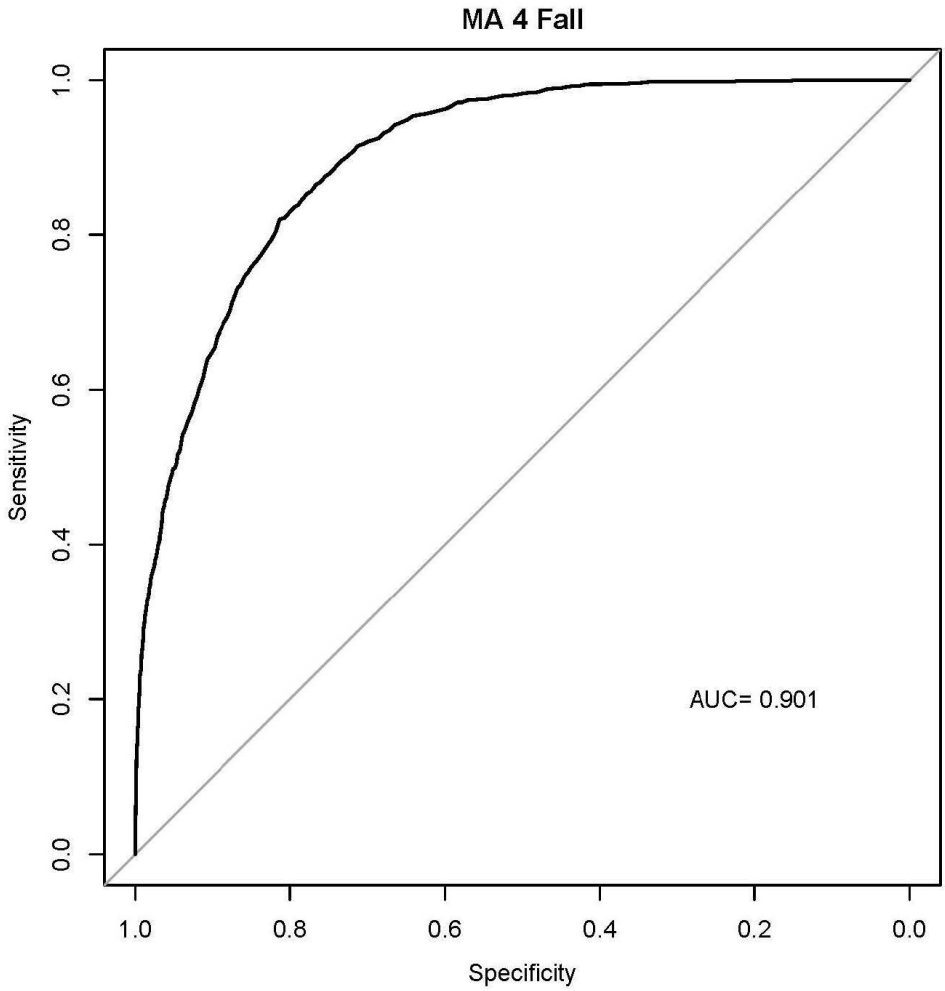
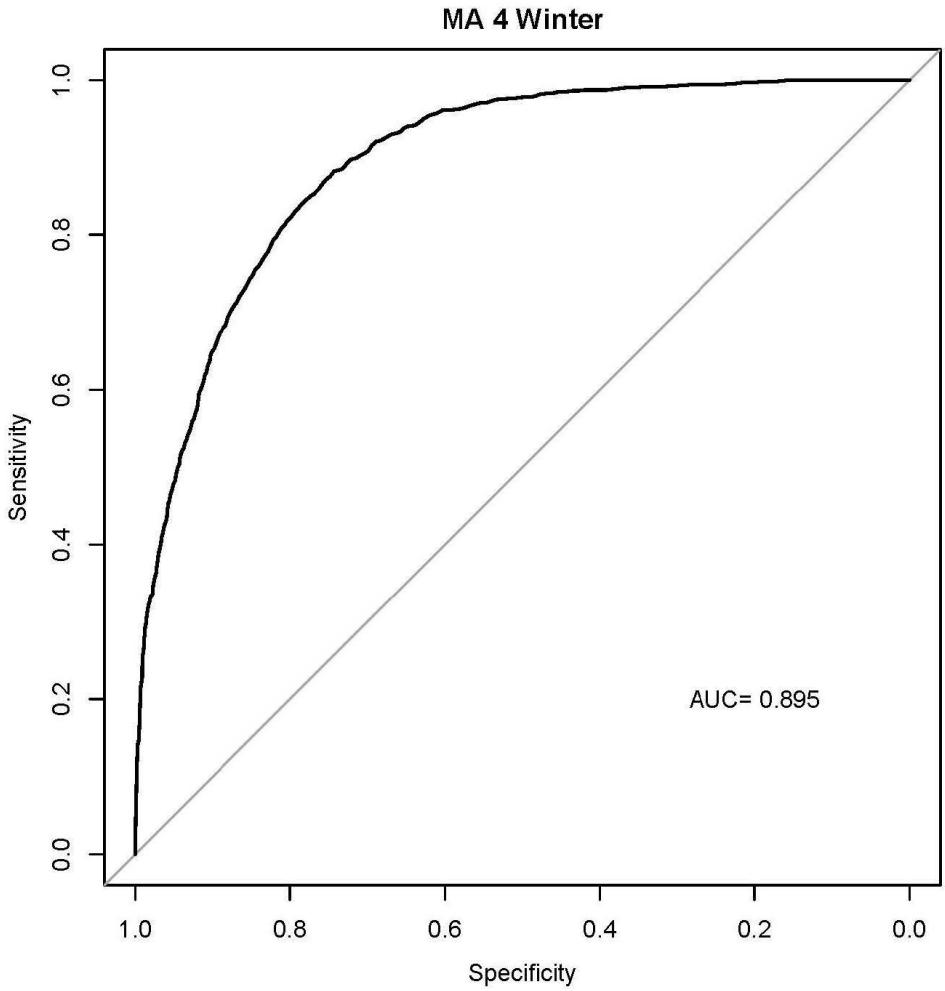
0.6
0.4
0.2
0.0
AUC= 0.901


MA 3 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.886


MA 4 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.901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Sensitivity
Specificity
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0.4
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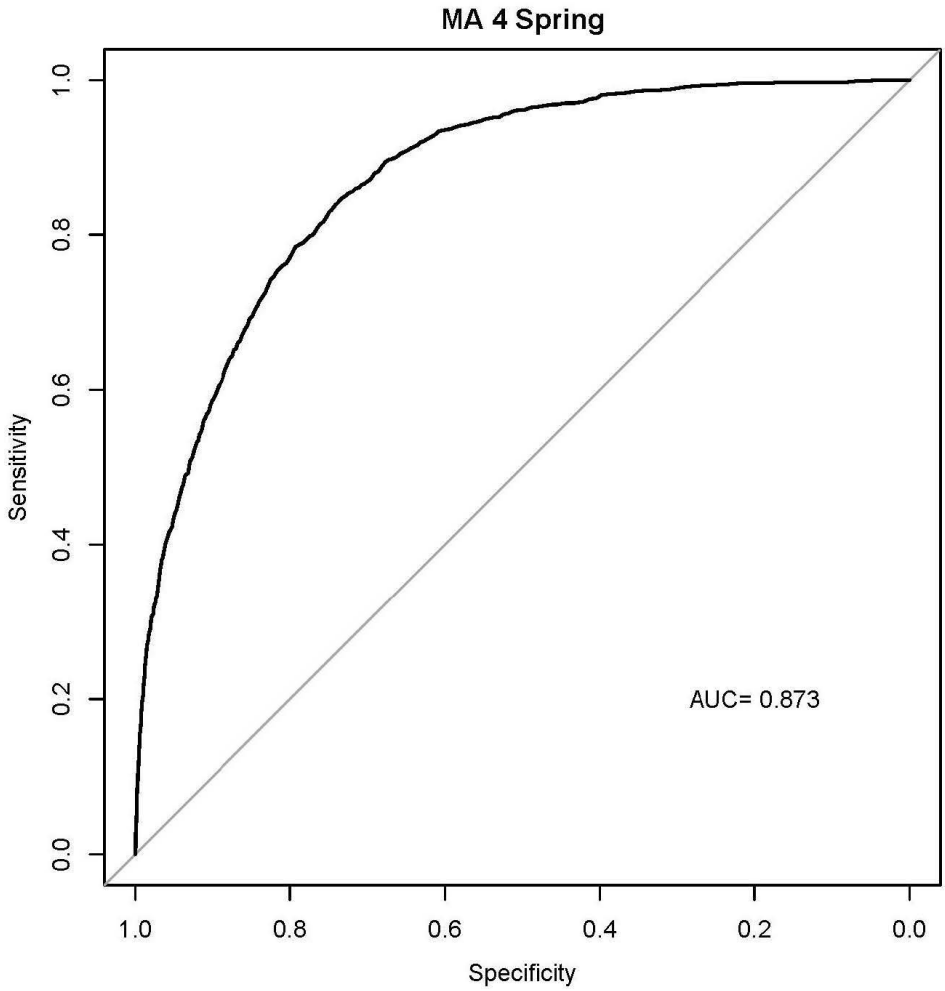
0.0
AUC= 0.895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Sensitivity
Specificity
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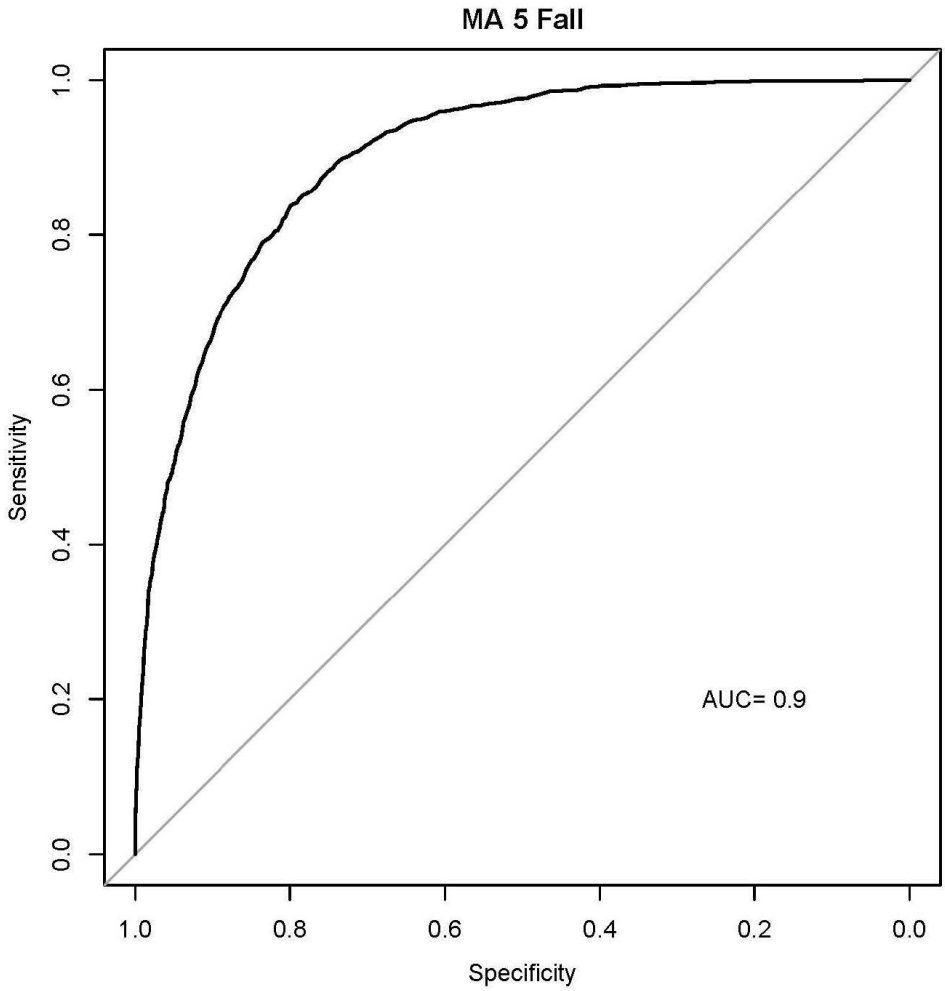
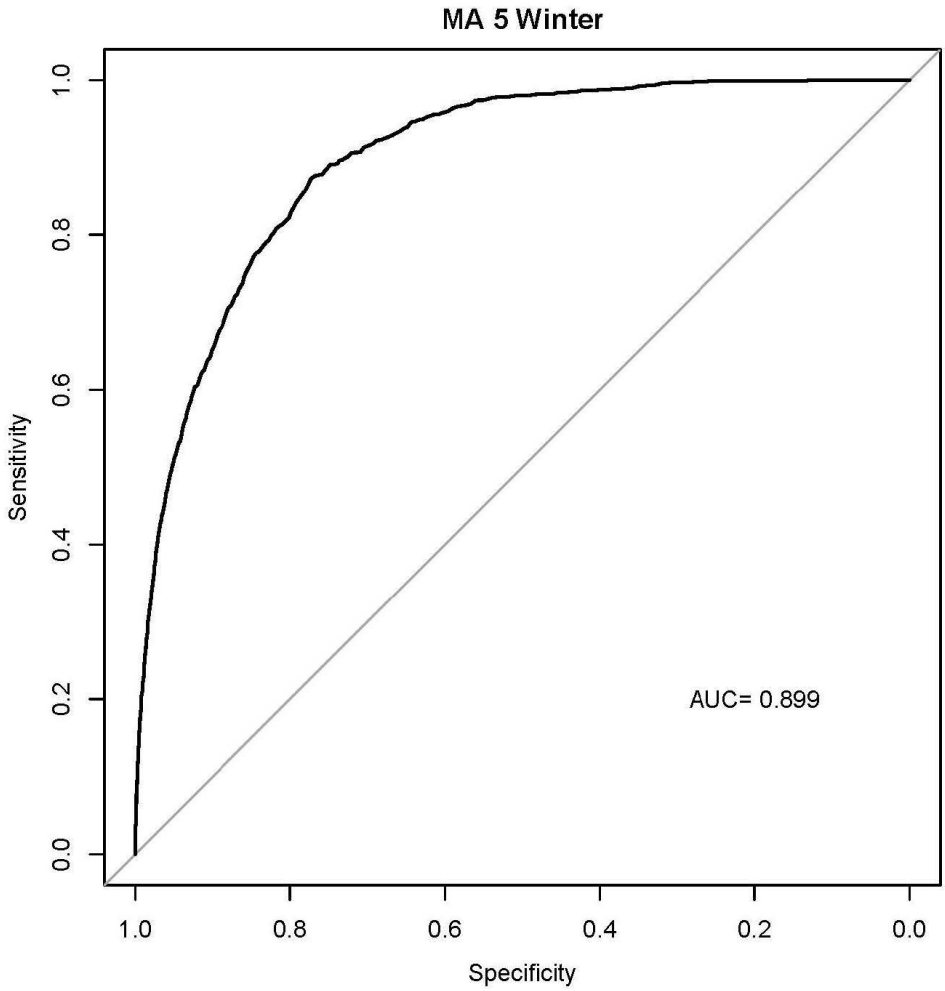
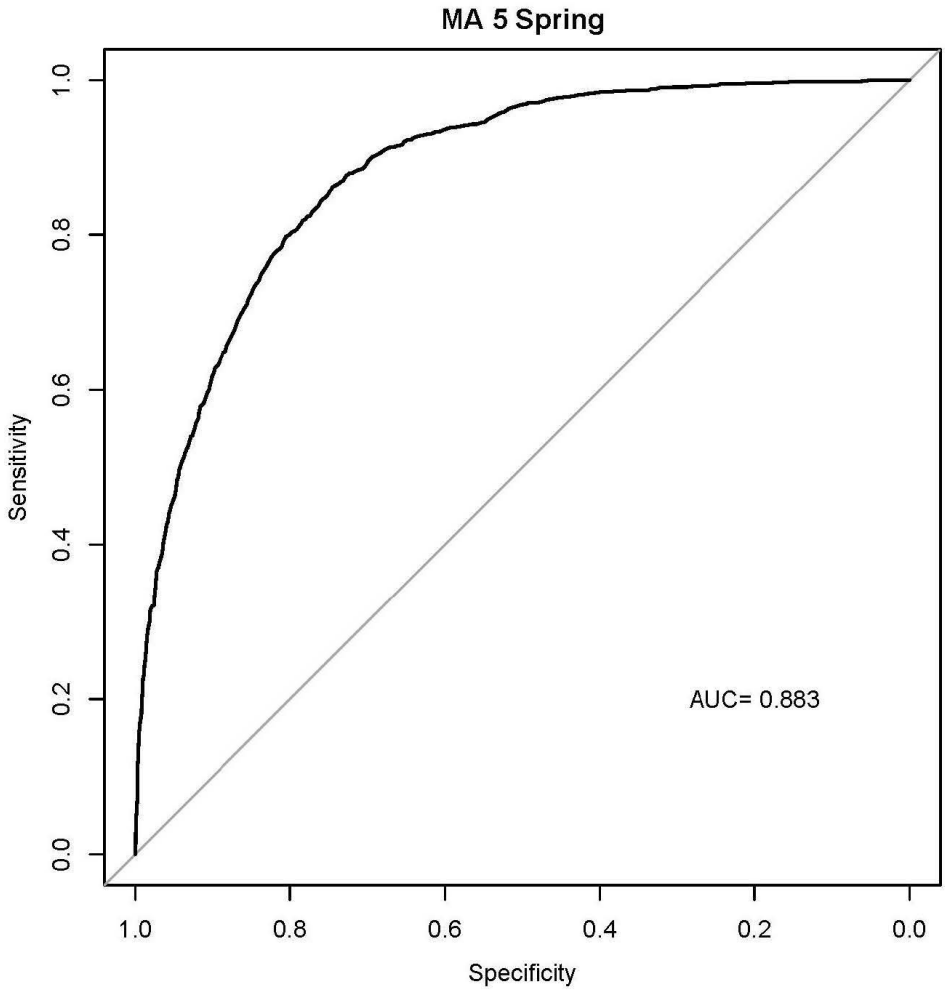
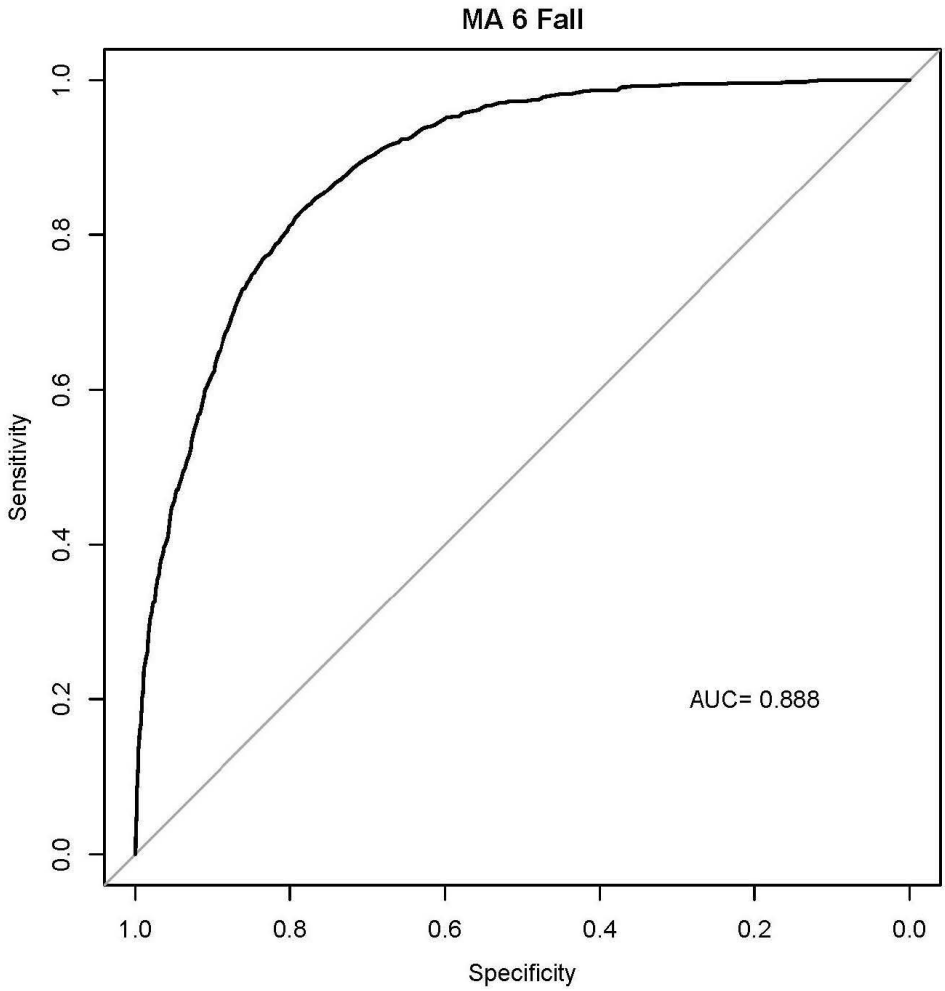
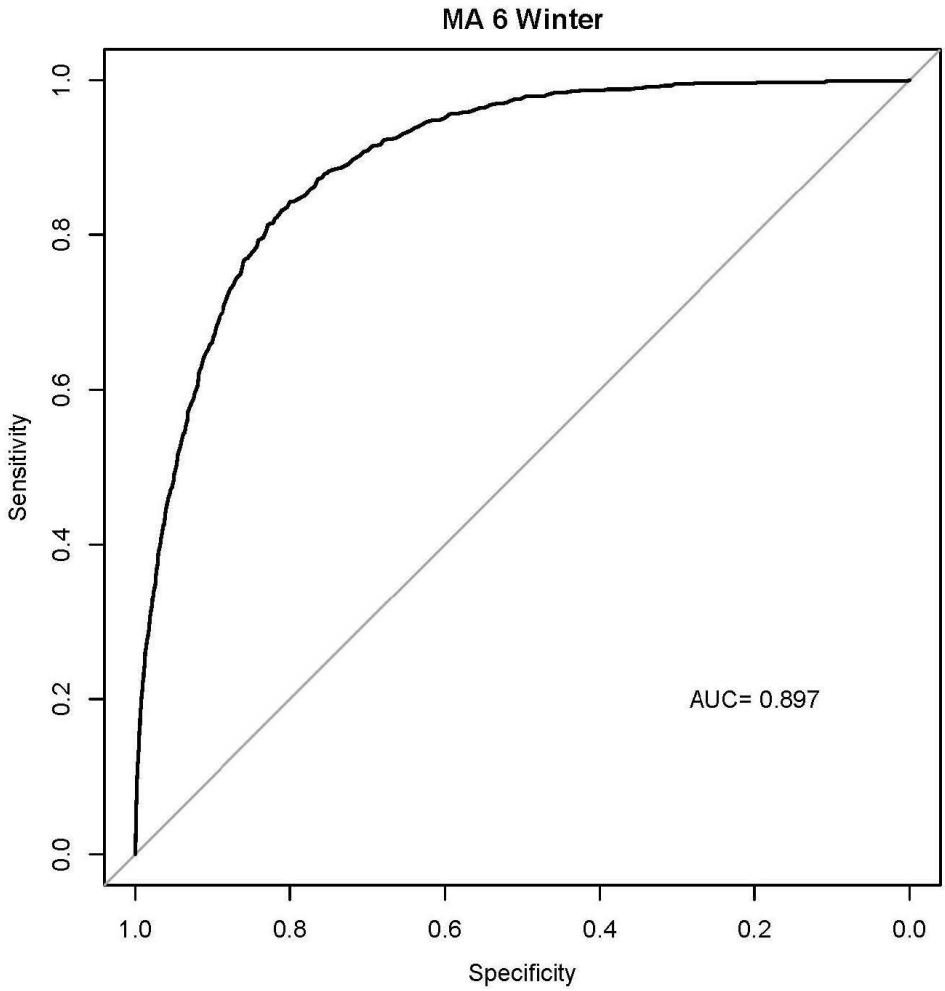
0.6
0.4
0.2
0.0
AUC= 0.873

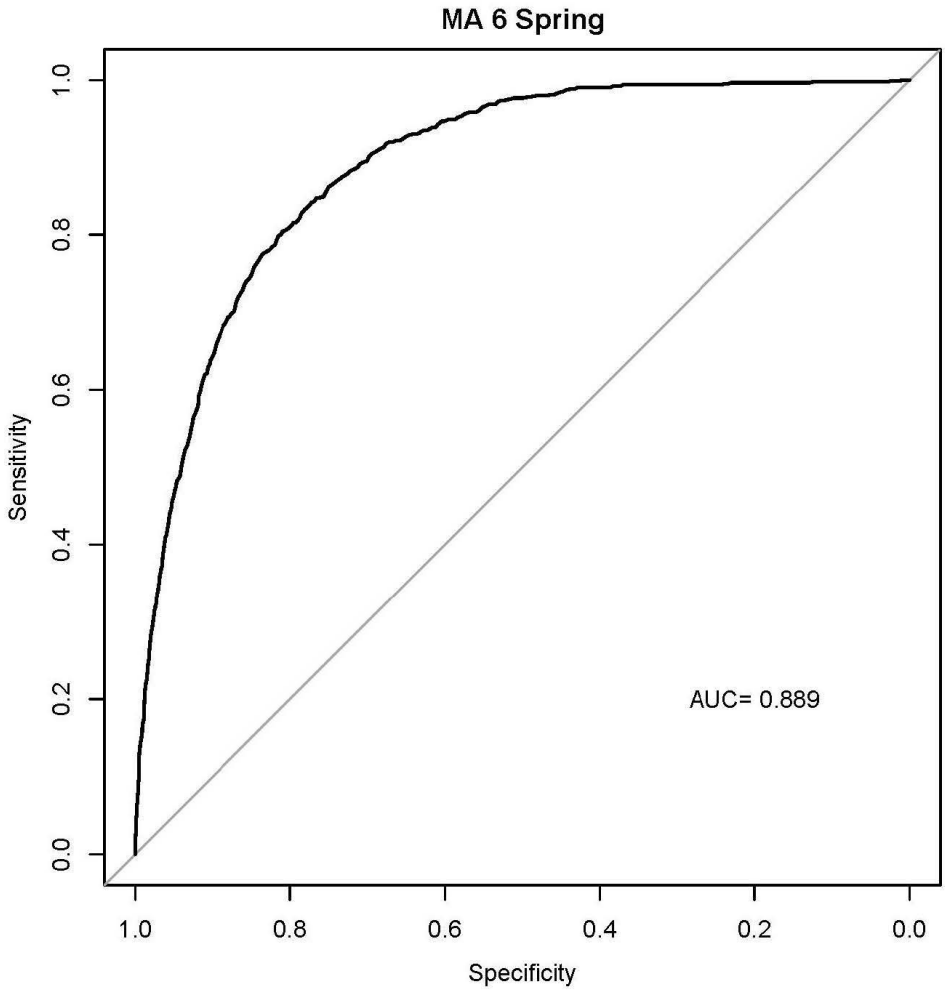

MA 5 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.9

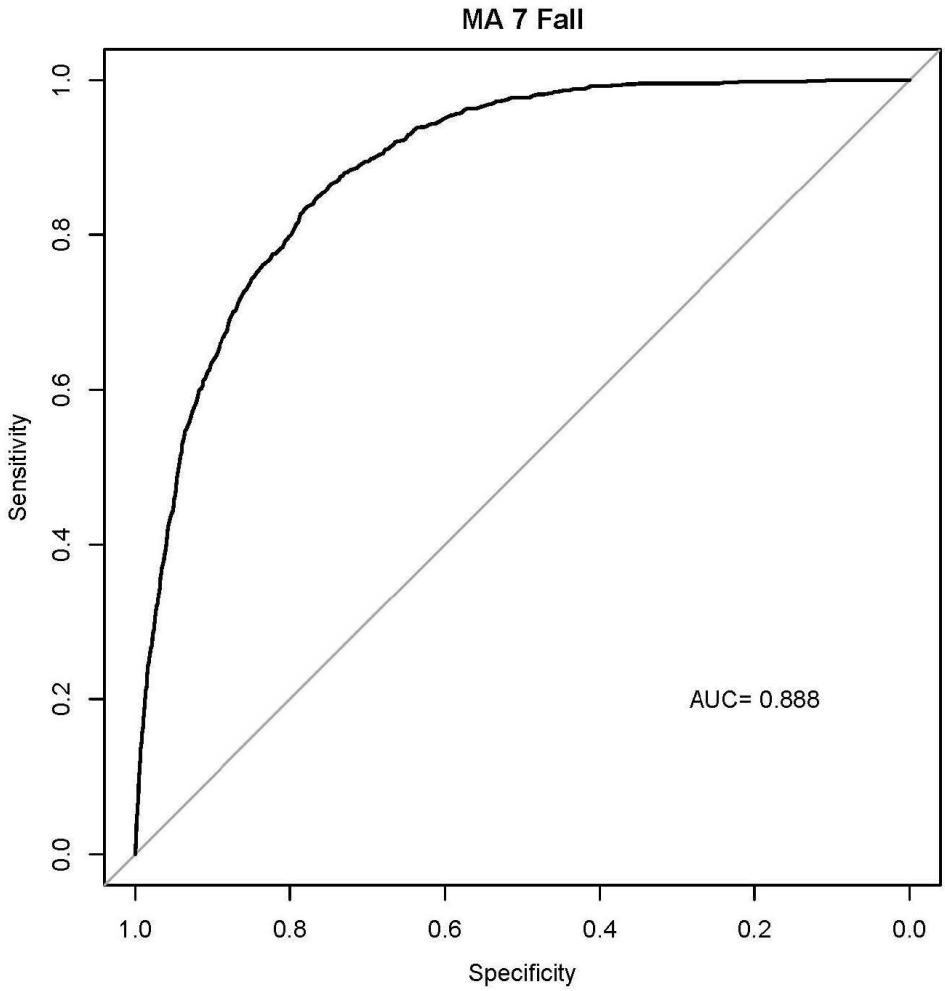

MA 5 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.899

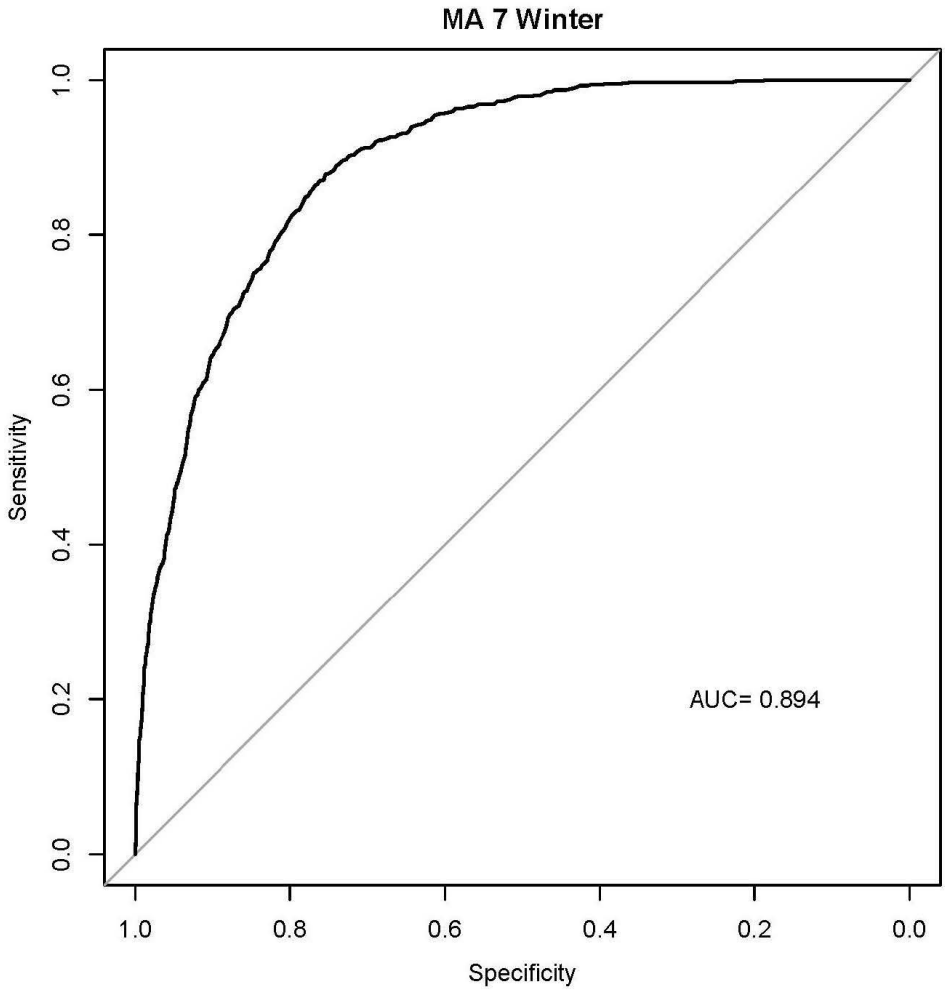

MA 5 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.883

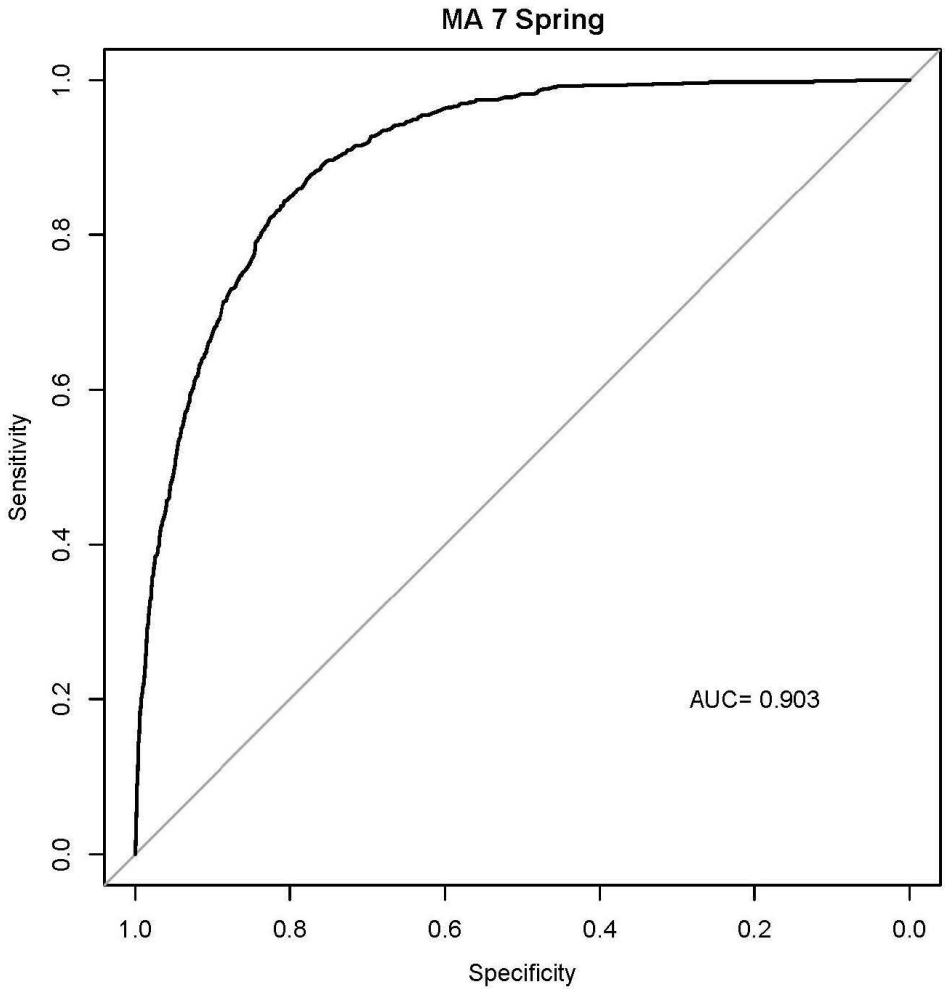

MA 6 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.888

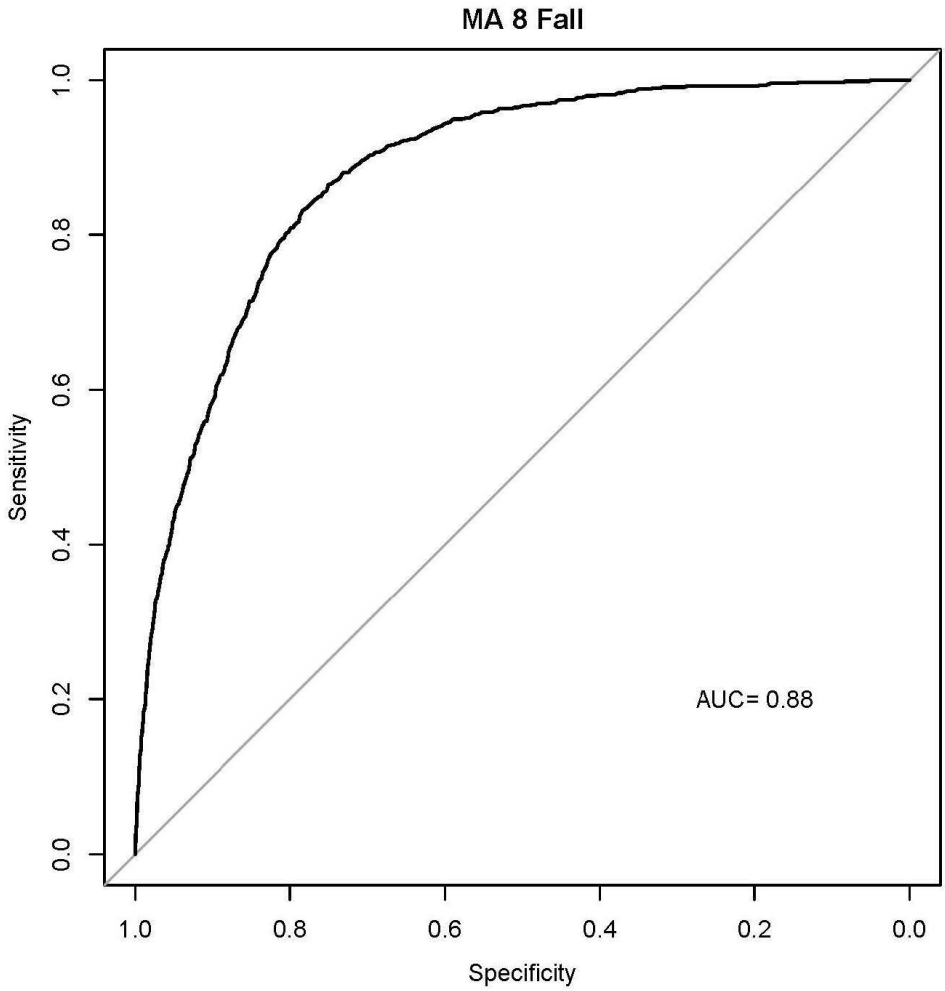

MA 6 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.897

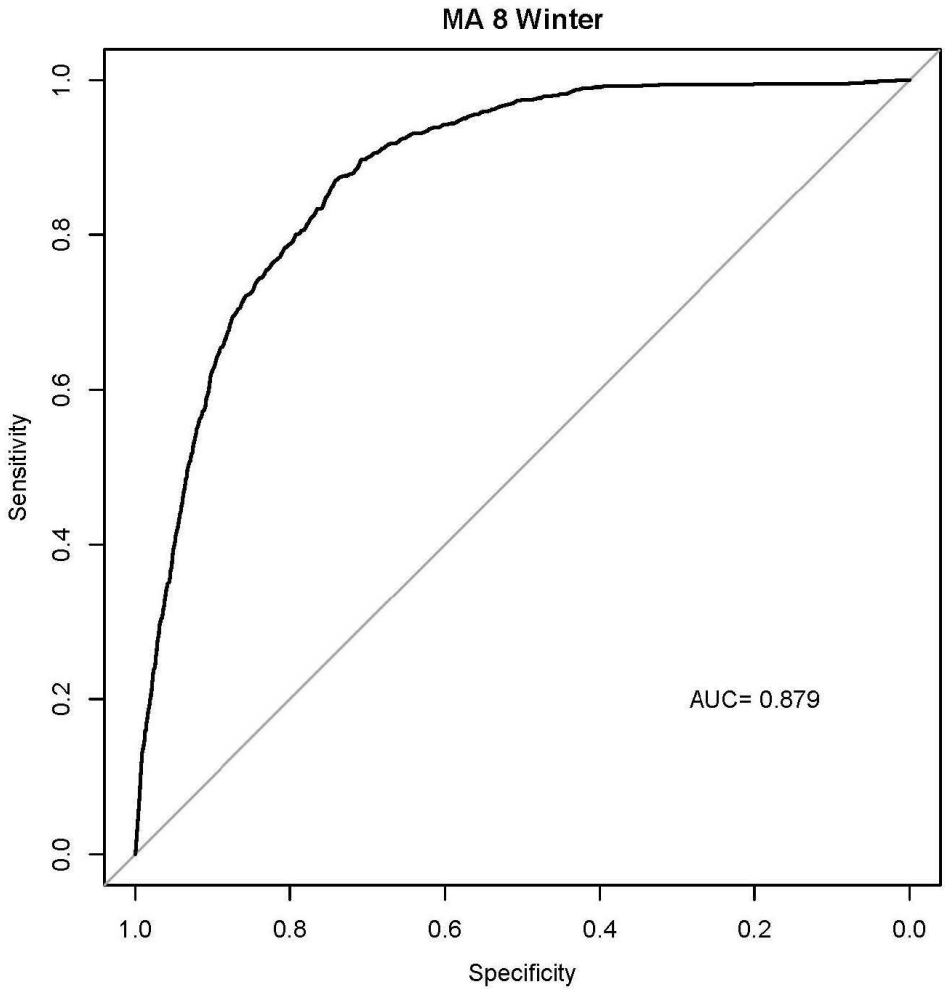

MA 6 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.889

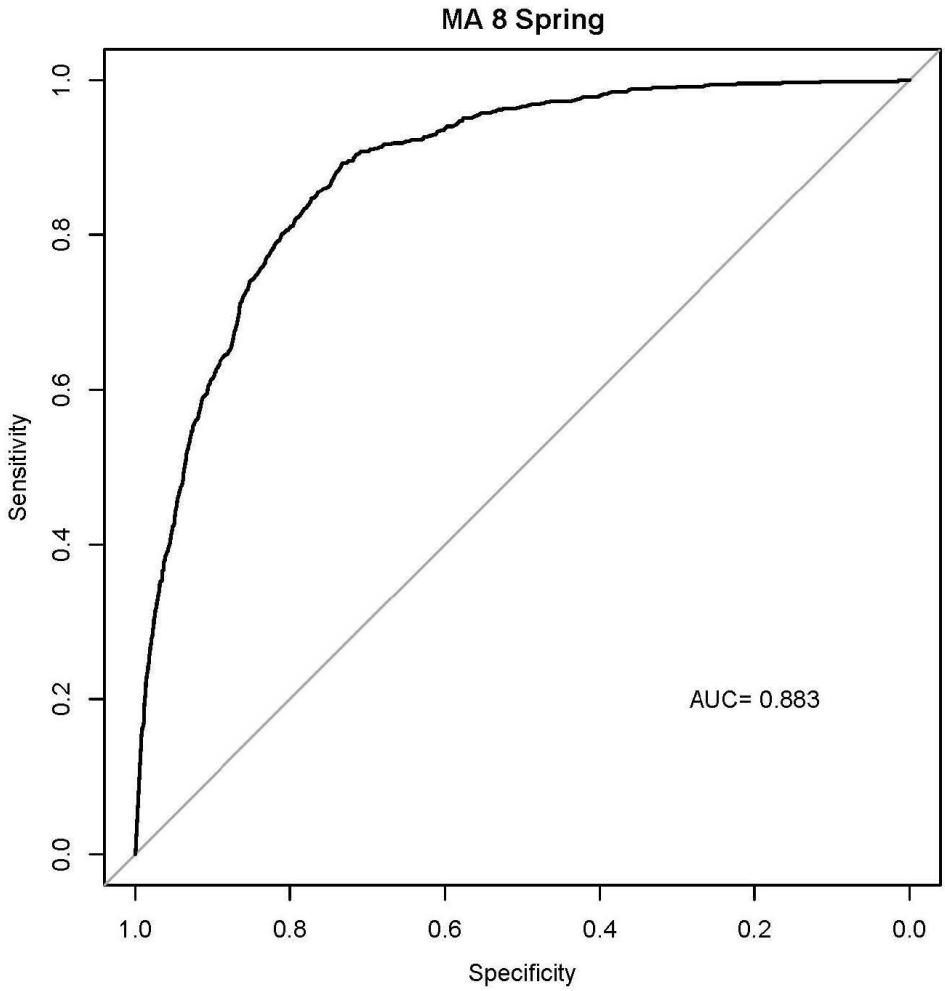

MA 7 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.888


MA 7 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.894

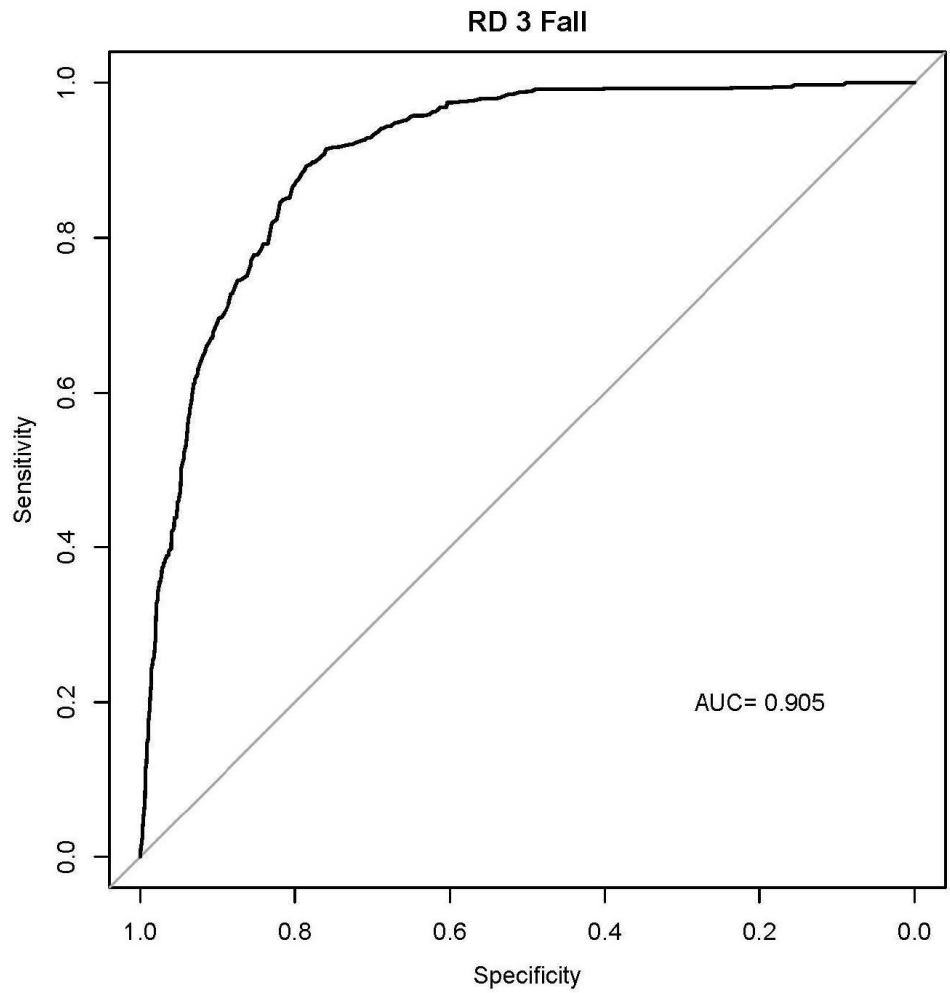

MA 7 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.903

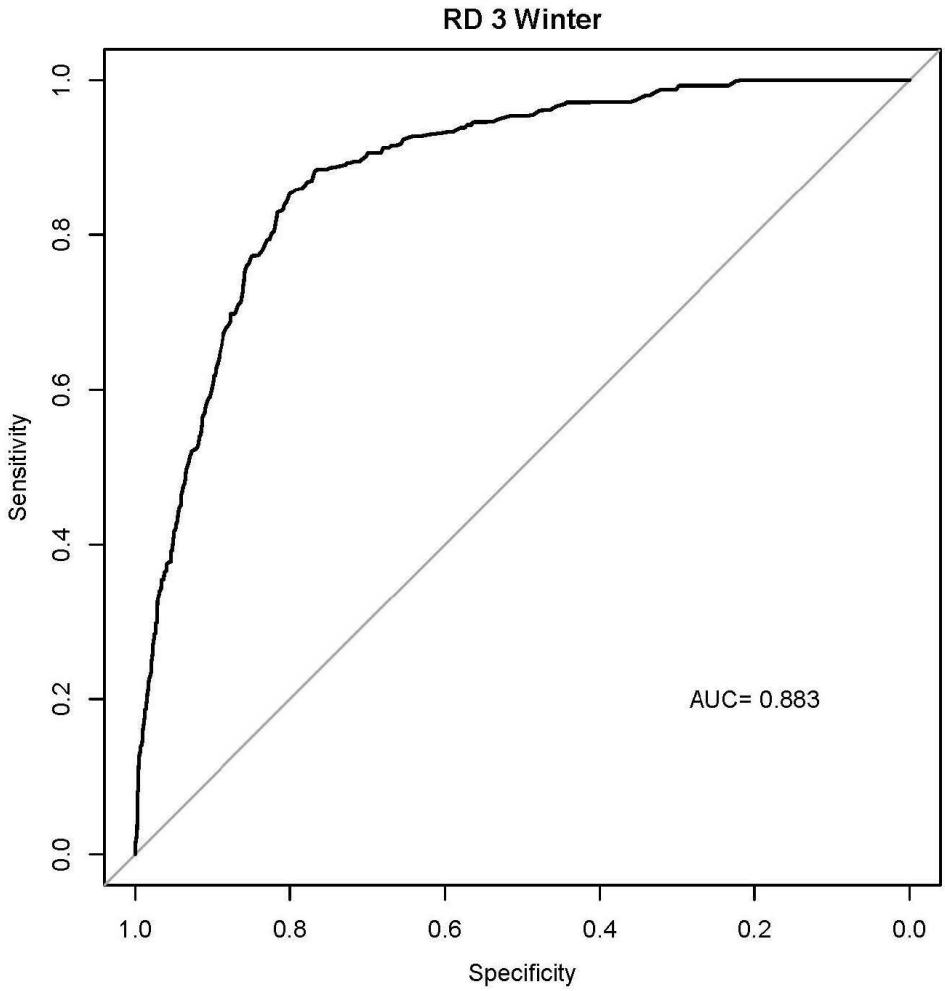

MA 8 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.88

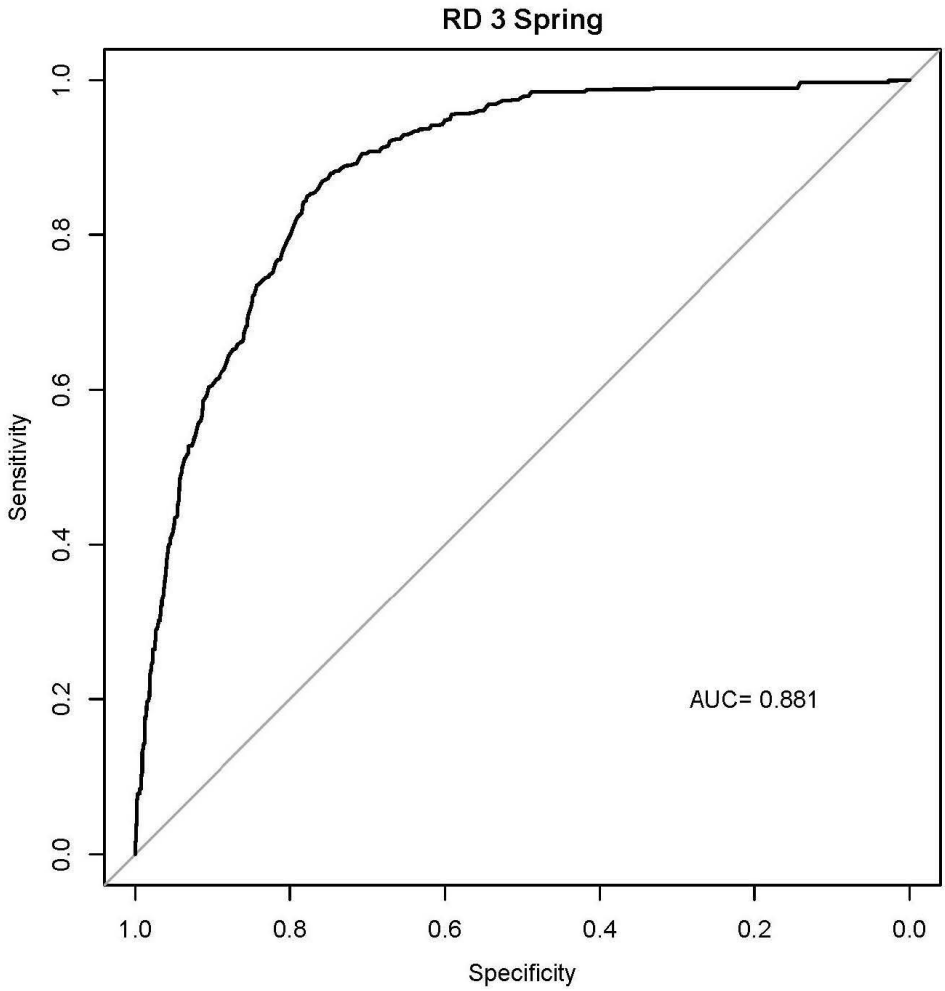

MA 8 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.879

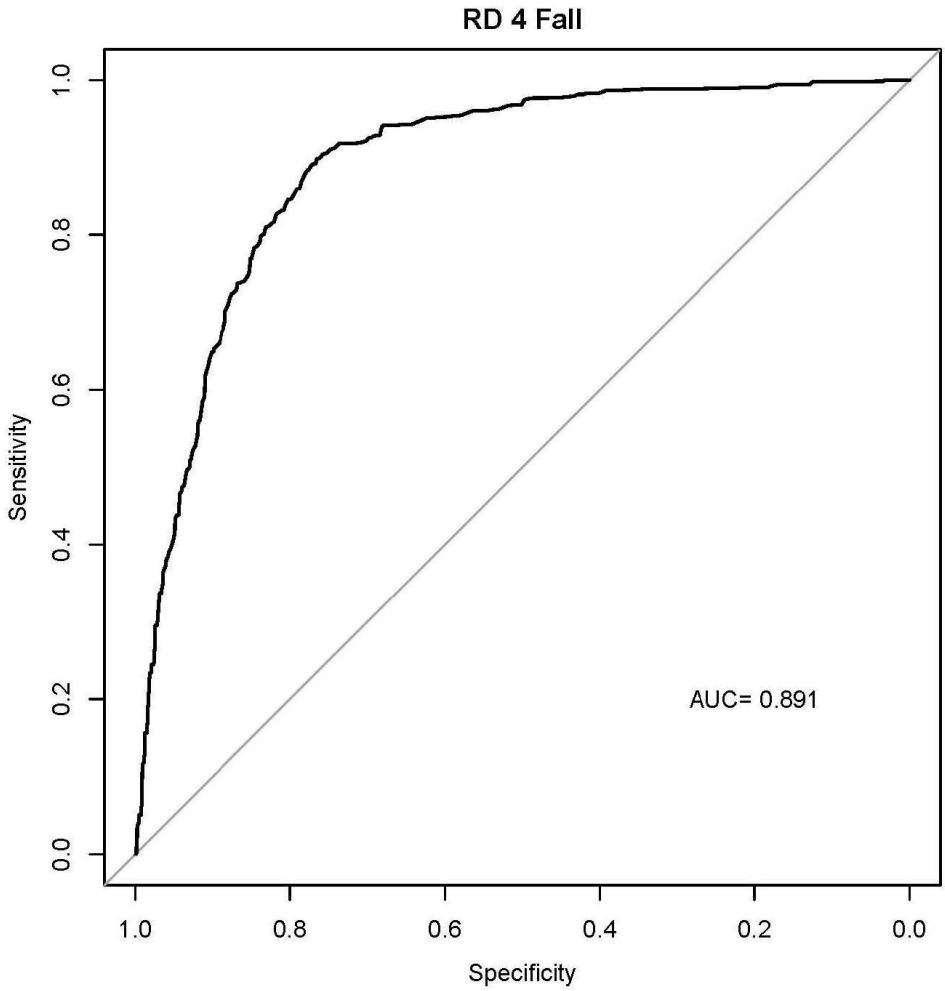

MA 8 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.883

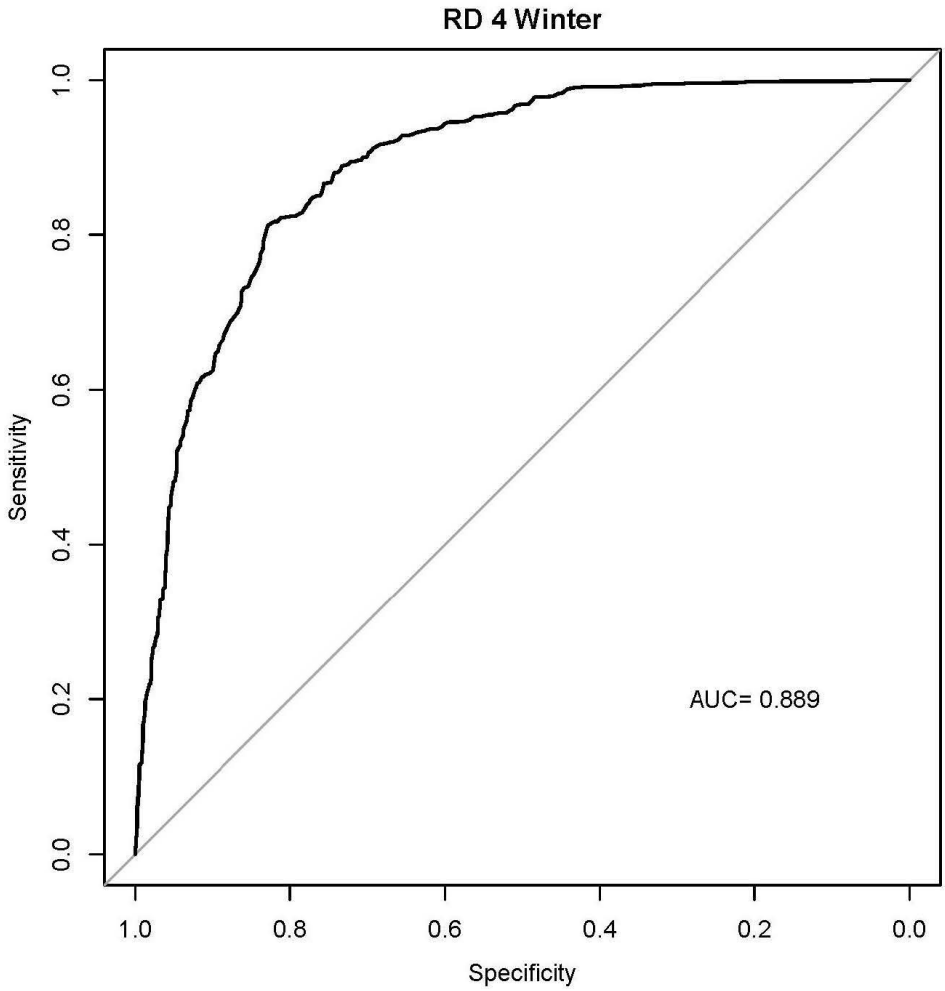
ROC curves of all grades/subjects/seasons for the resampled data

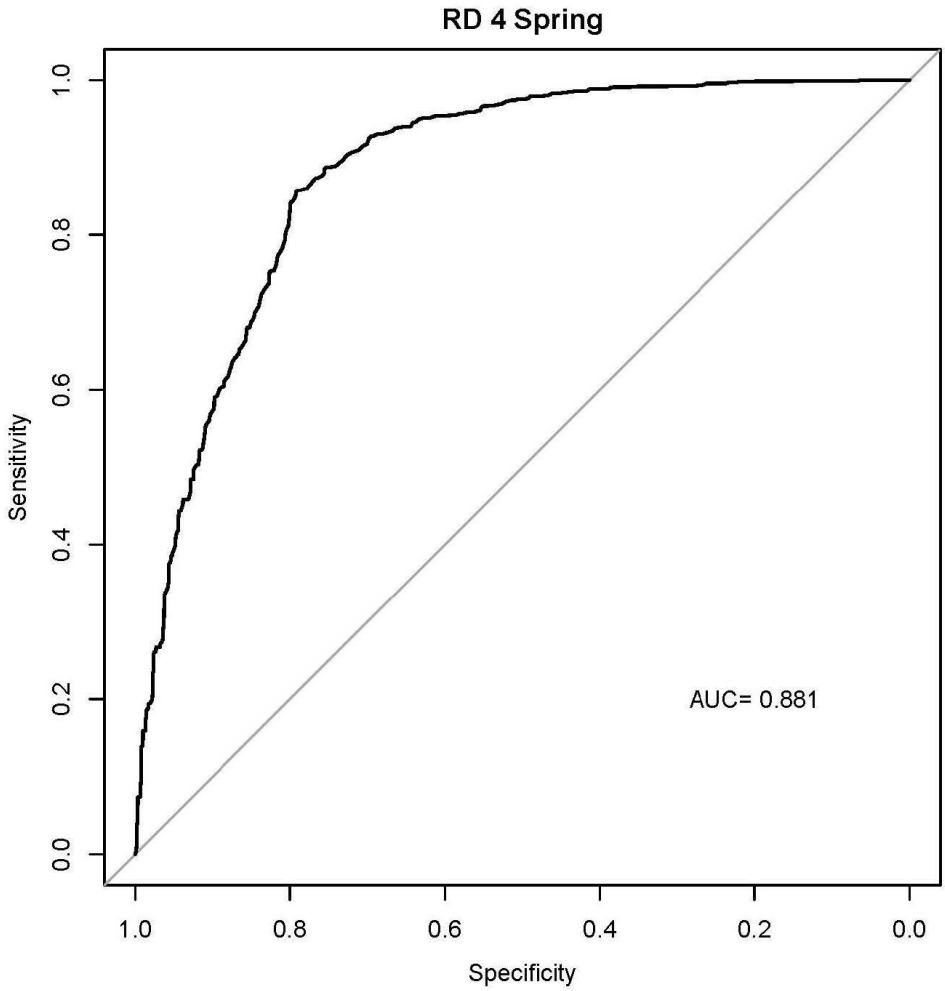


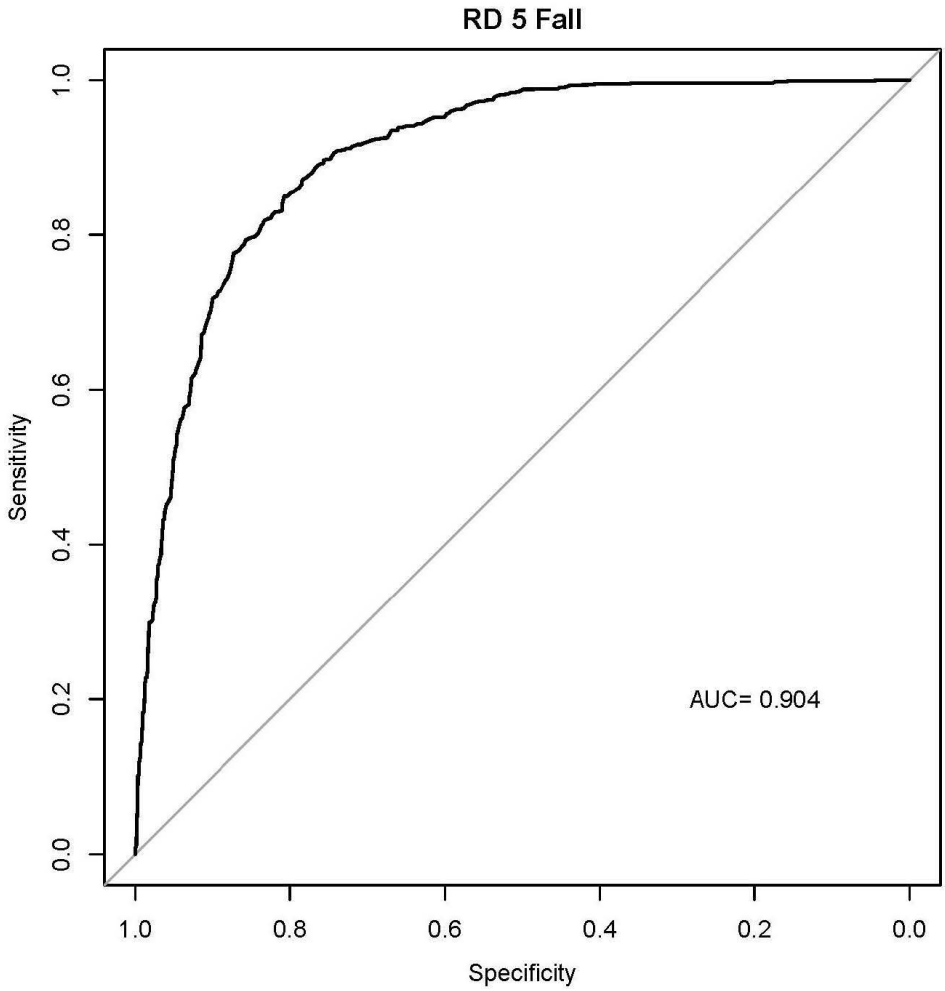

RD 3 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.883

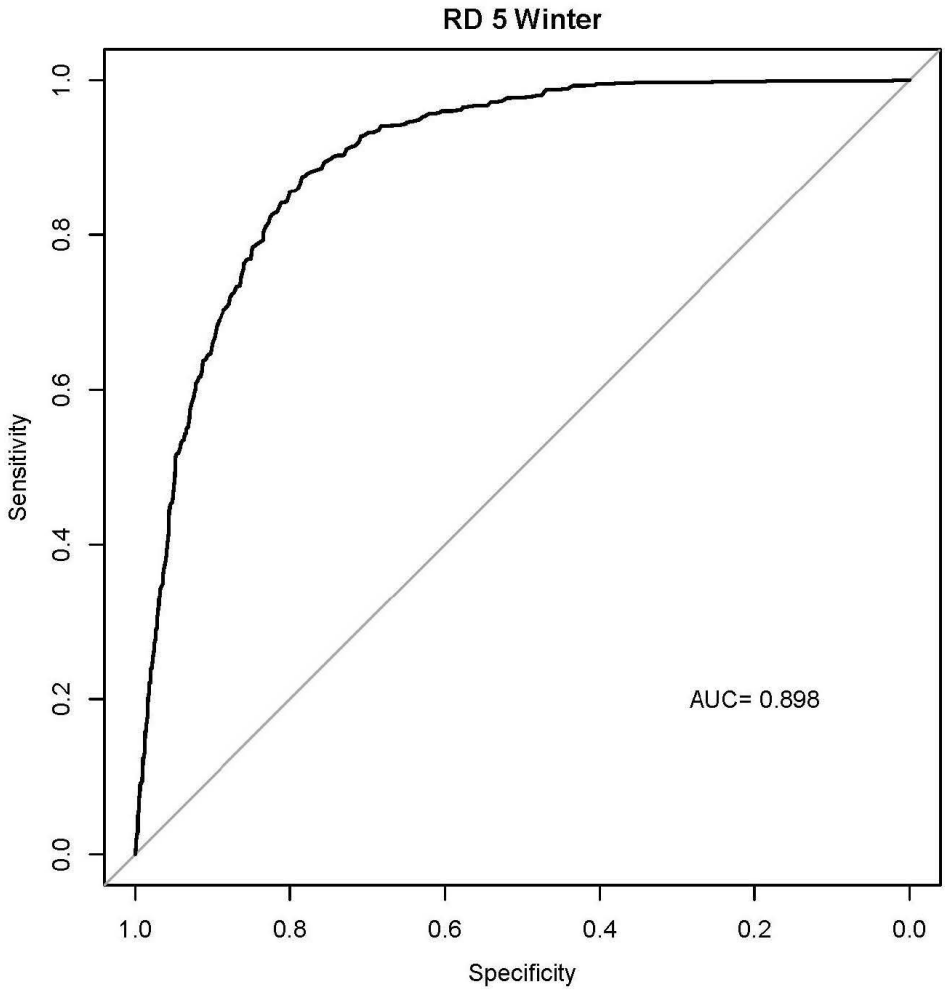

RD 3 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.881

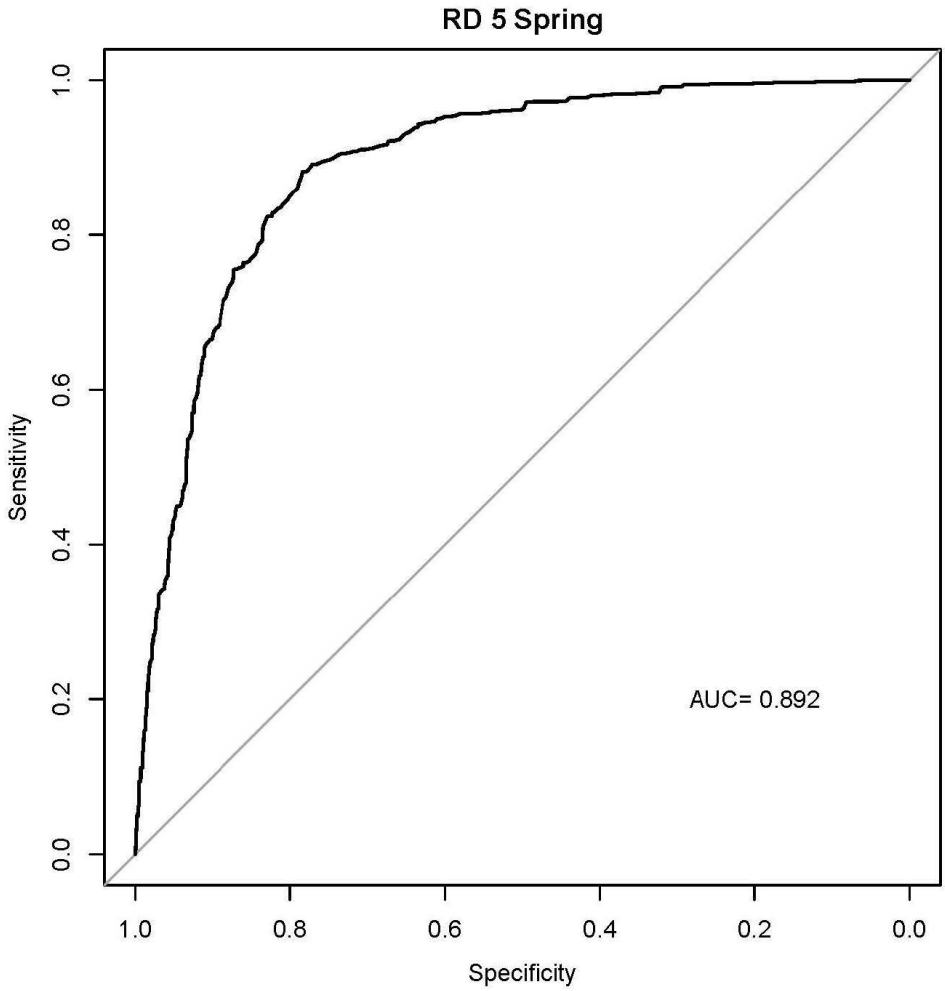

RD 4 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.891

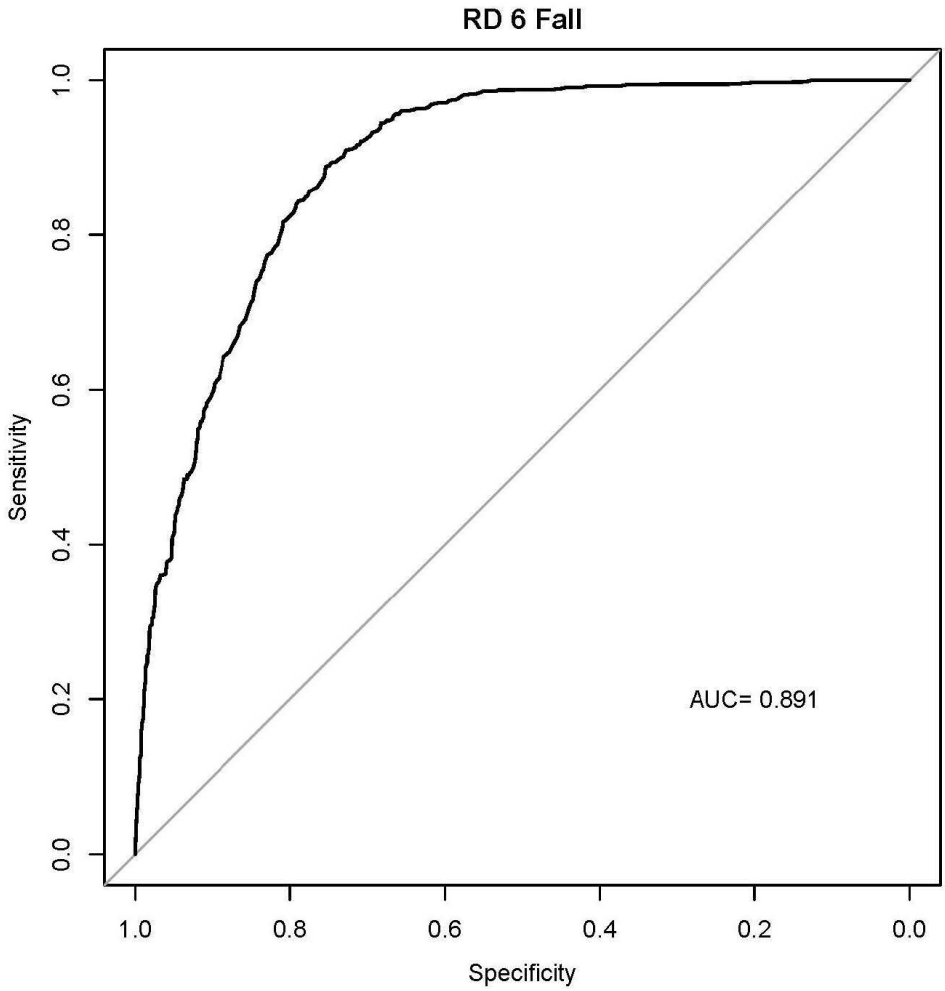

RD 4 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.889

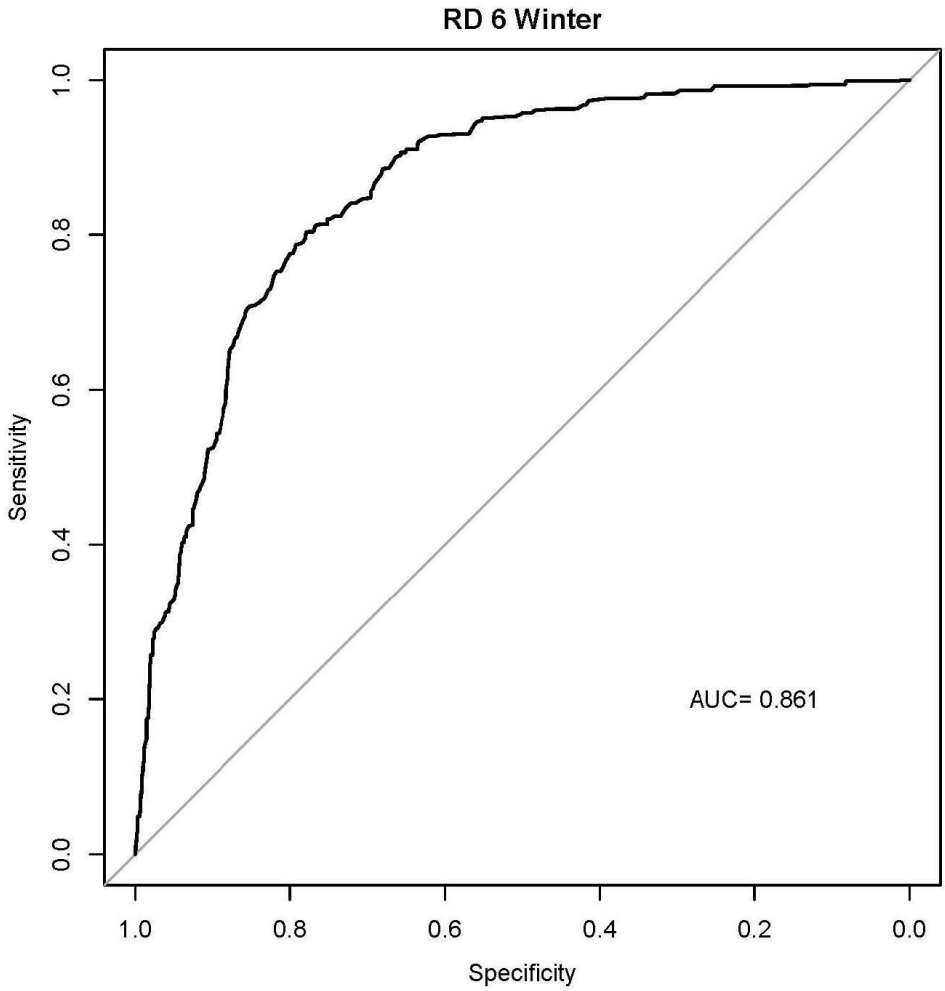

RD 4 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.881

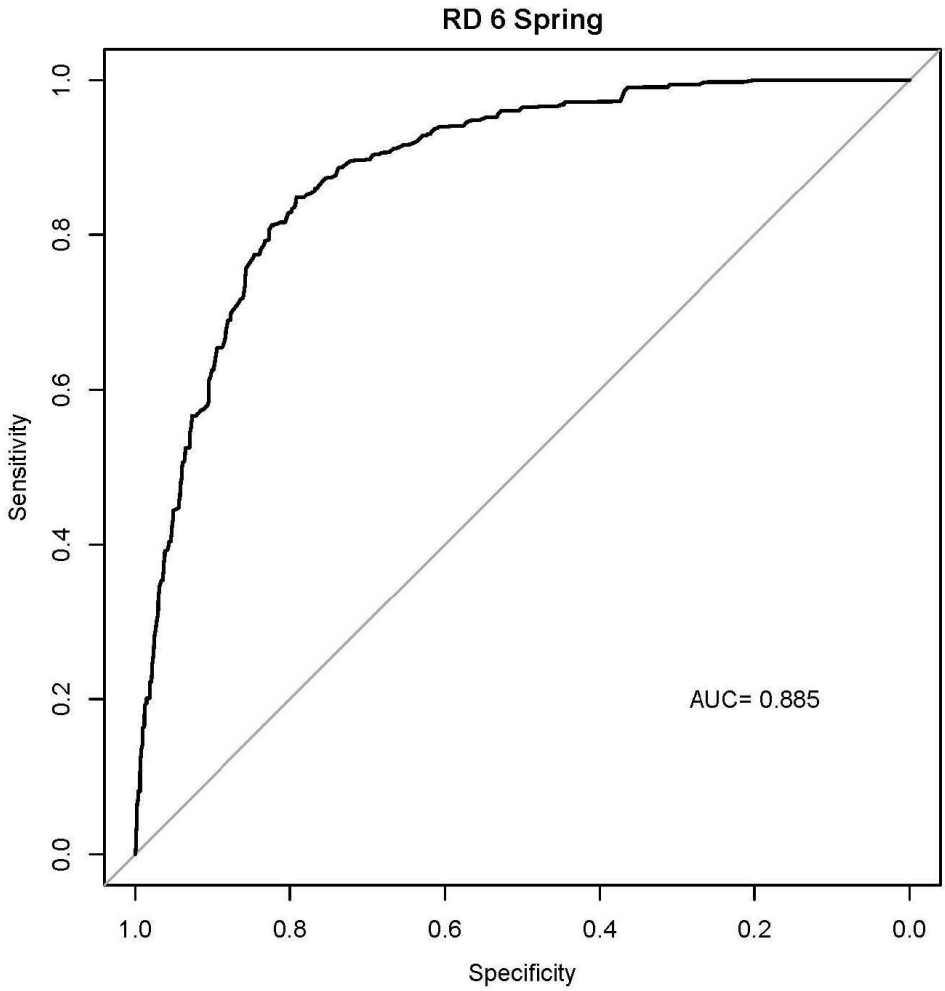

RD 5 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.904

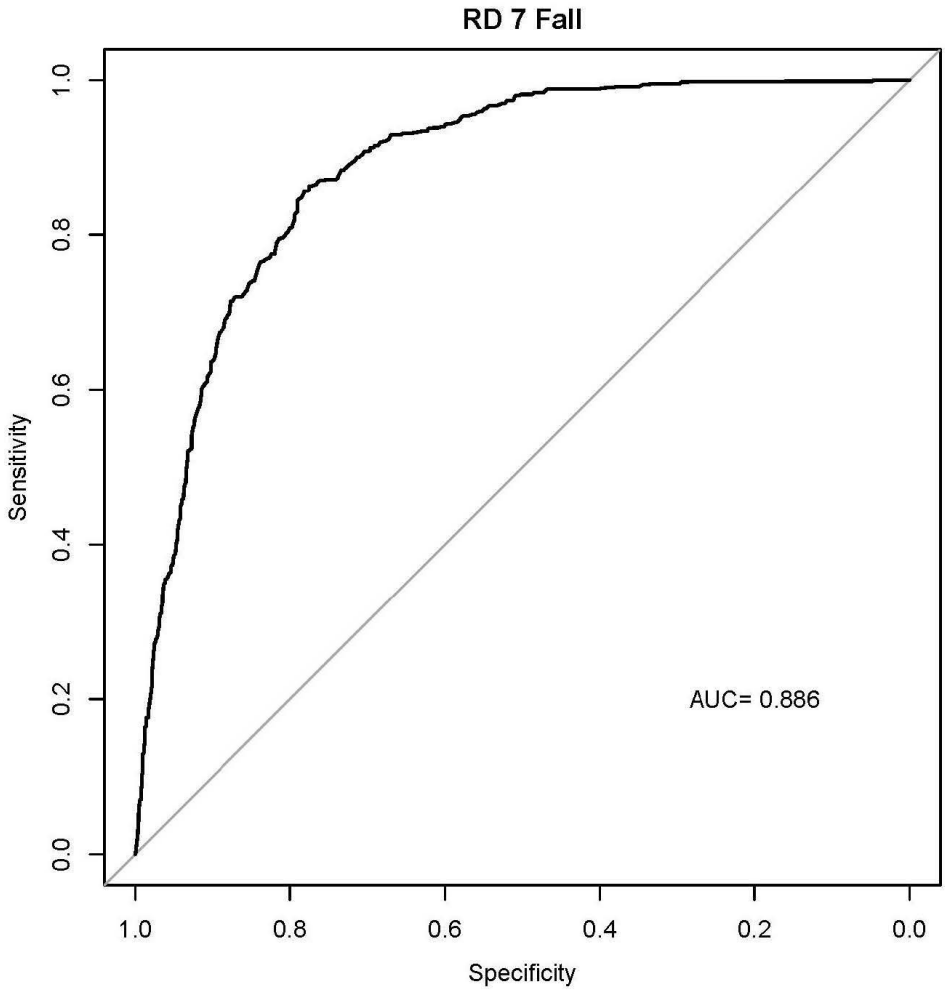

RD 5 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.898

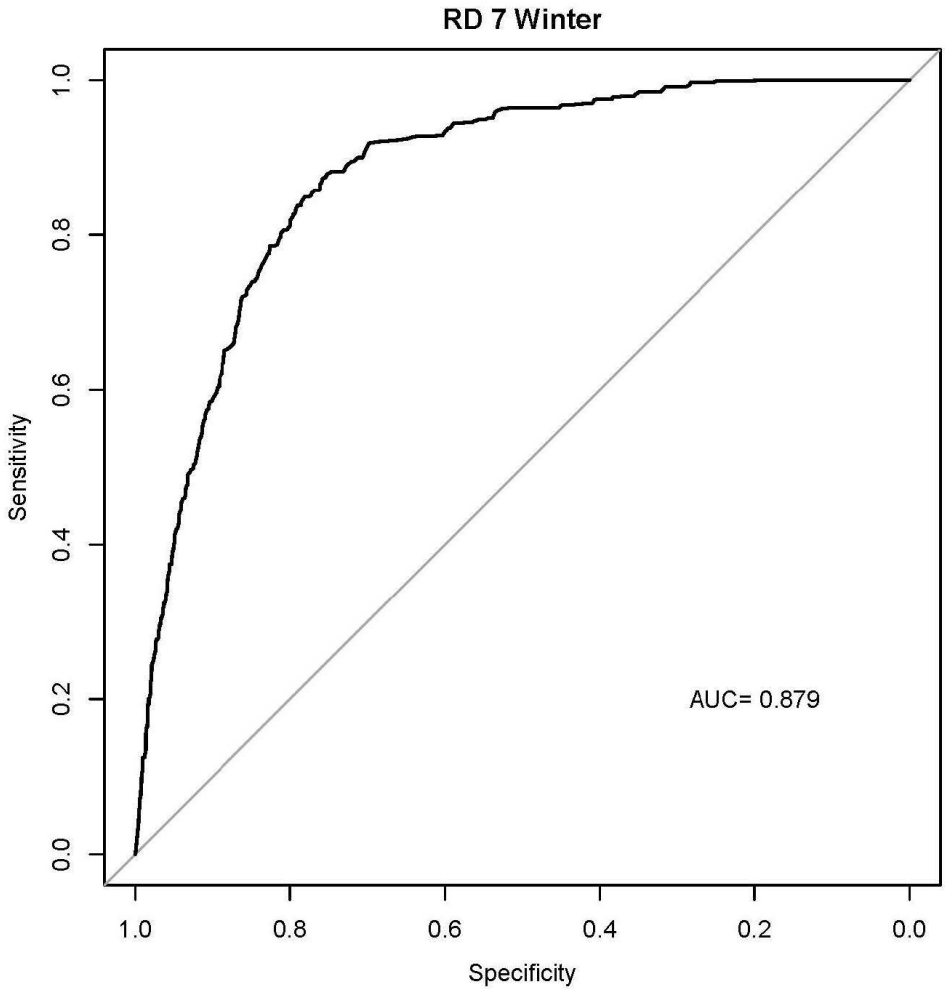

RD 5 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.892

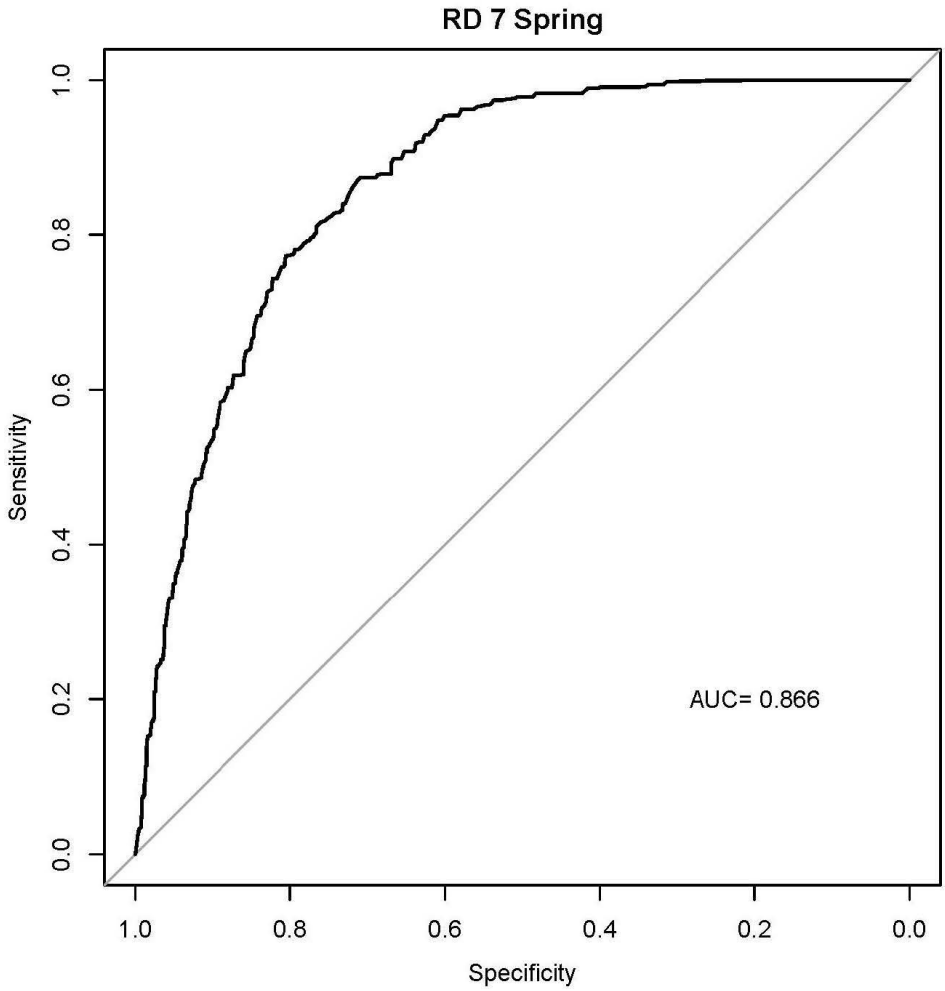

RD 6 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.891

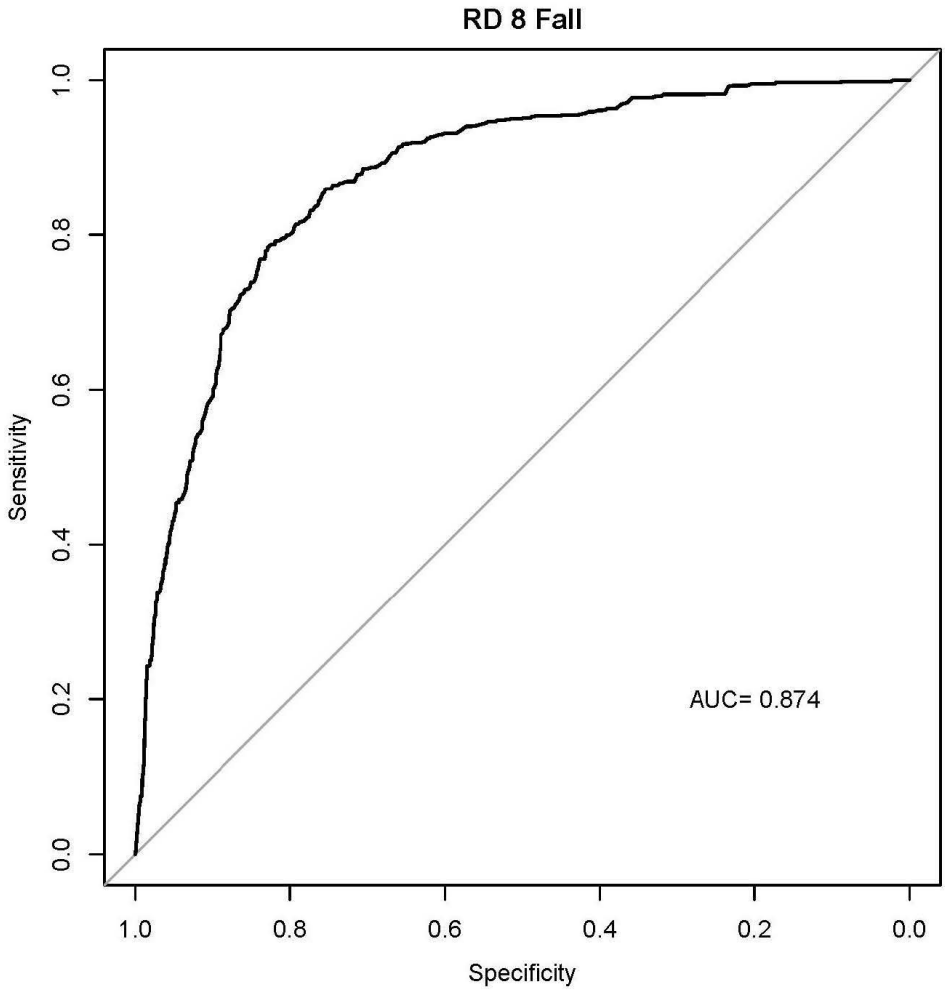

RD 6 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.861

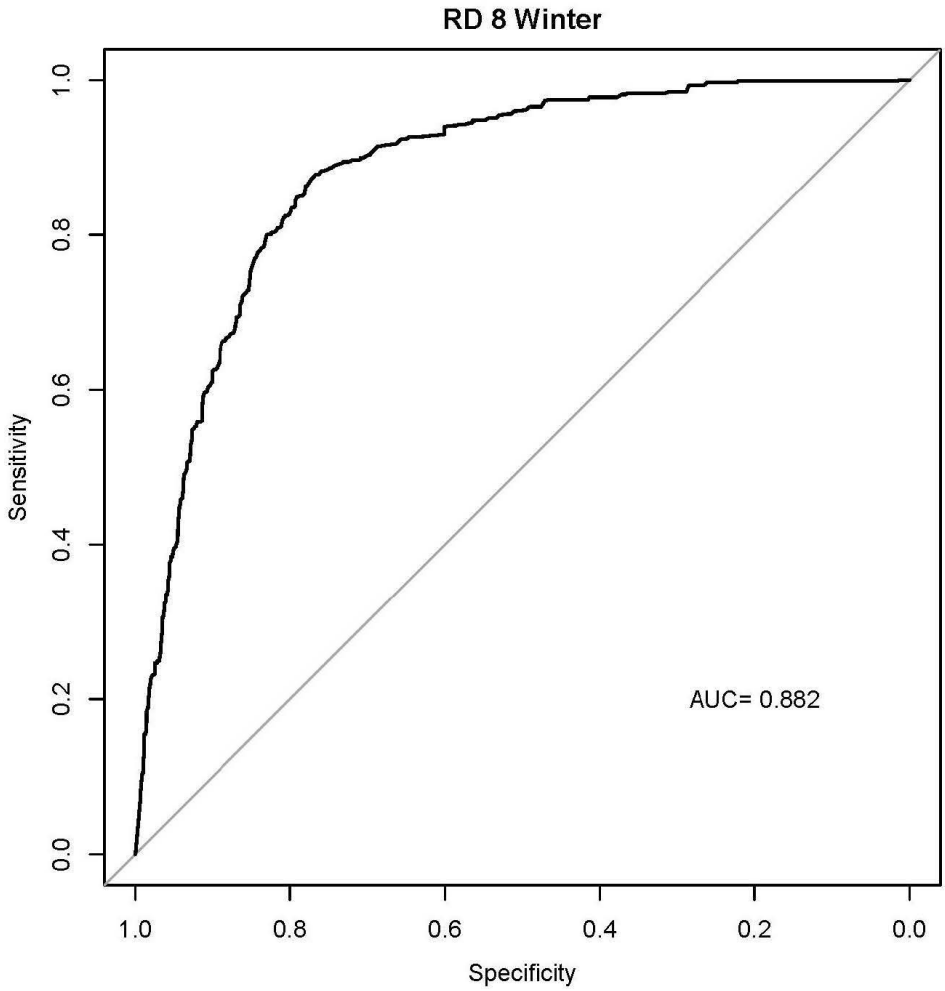

RD 6 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.885

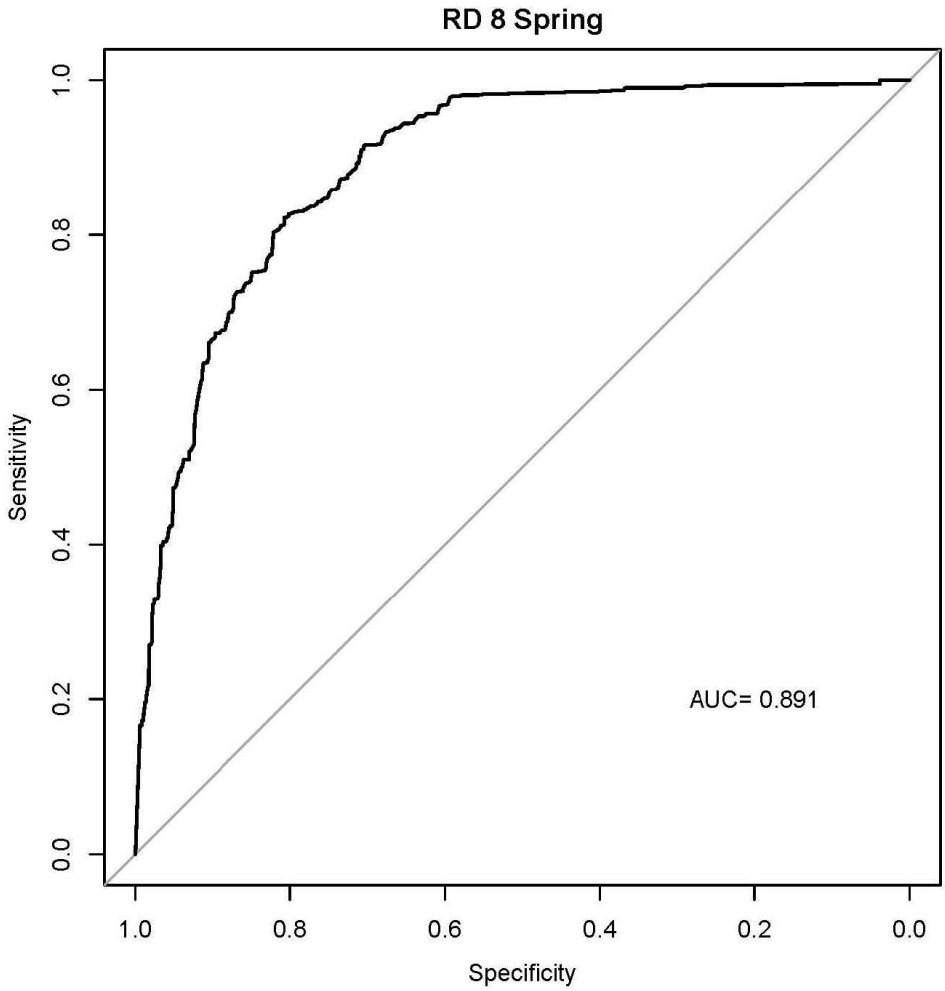

RD 7 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.886

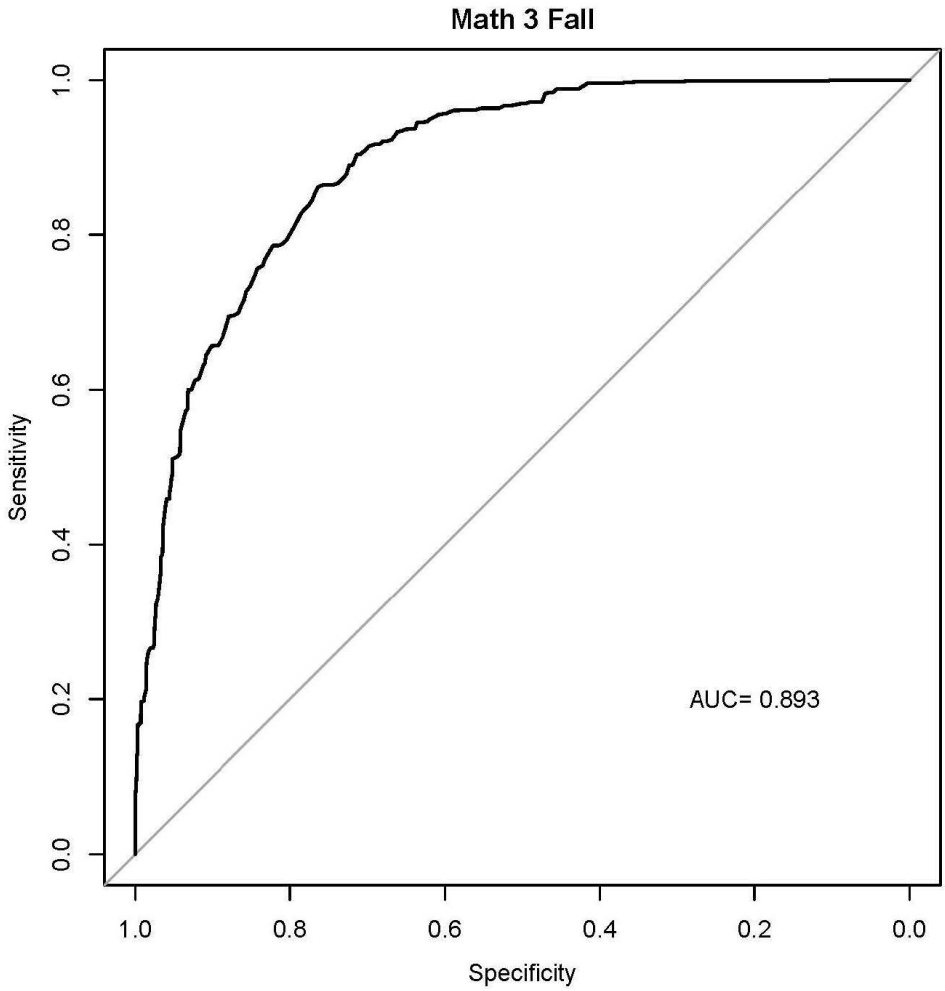

RD 7 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.879

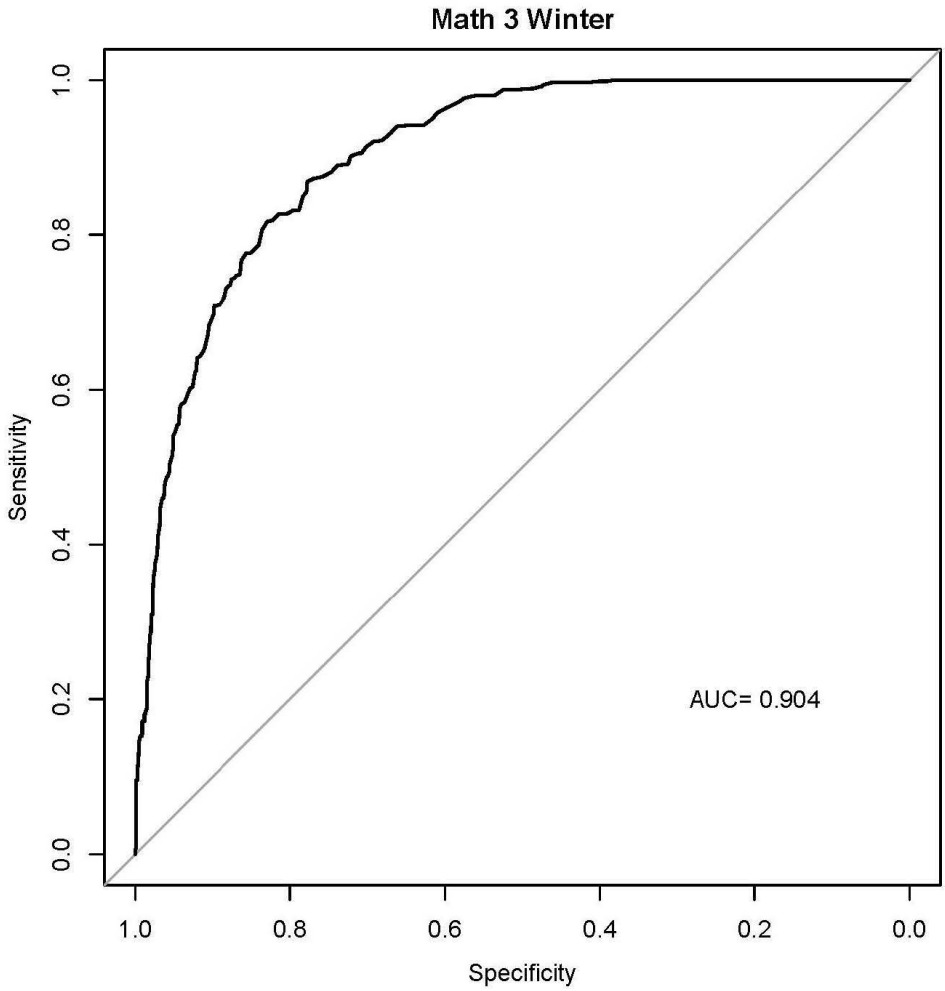

RD 7 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.866

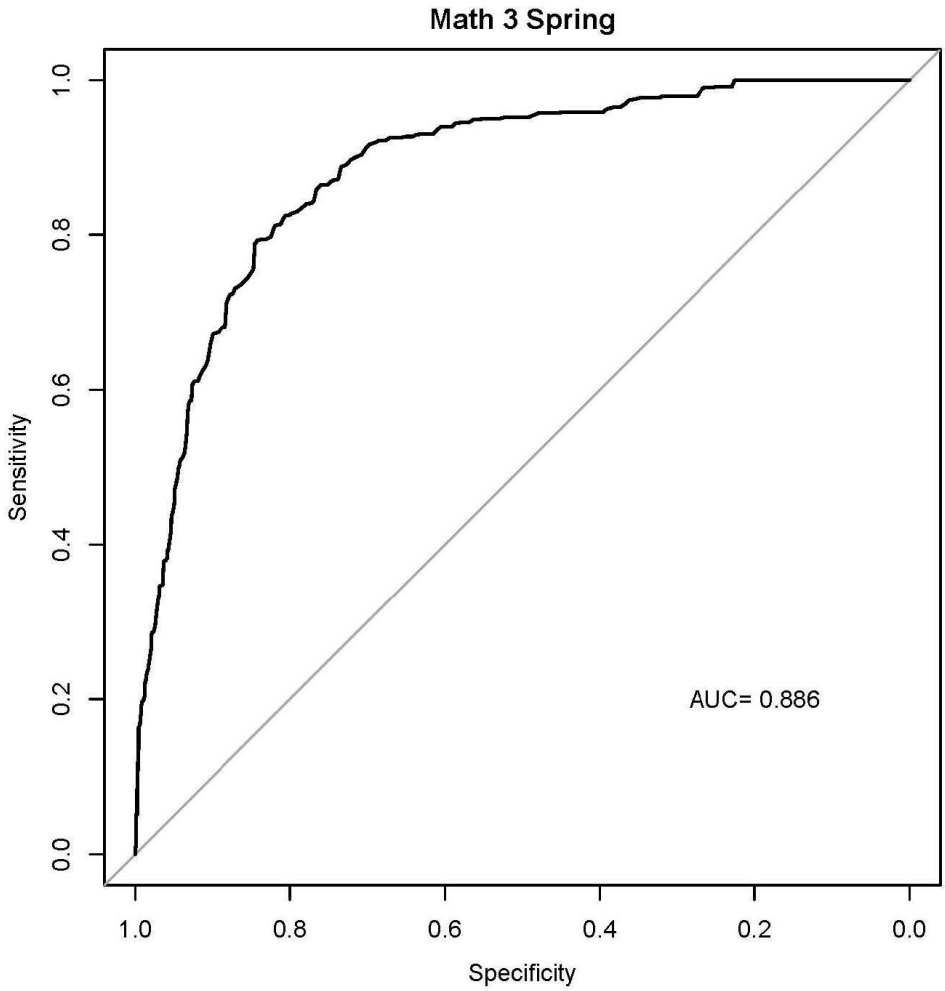

RD 8 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.874

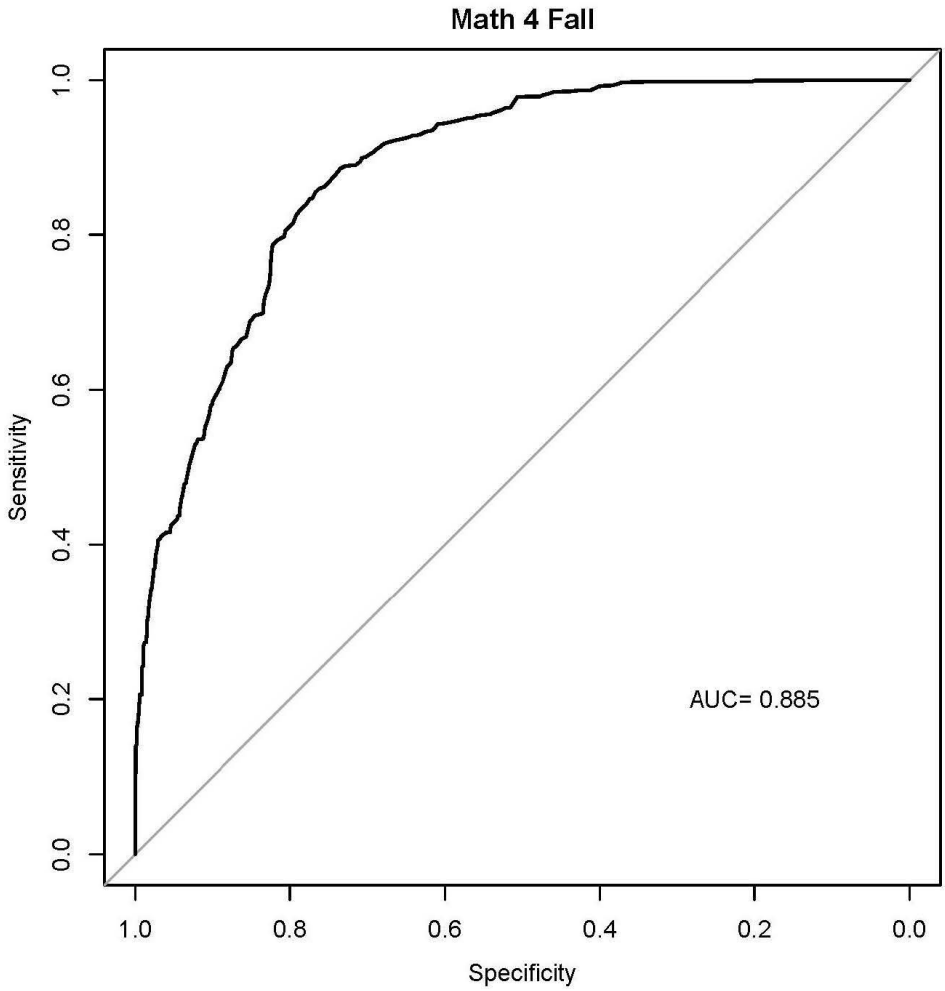

RD 8 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.882

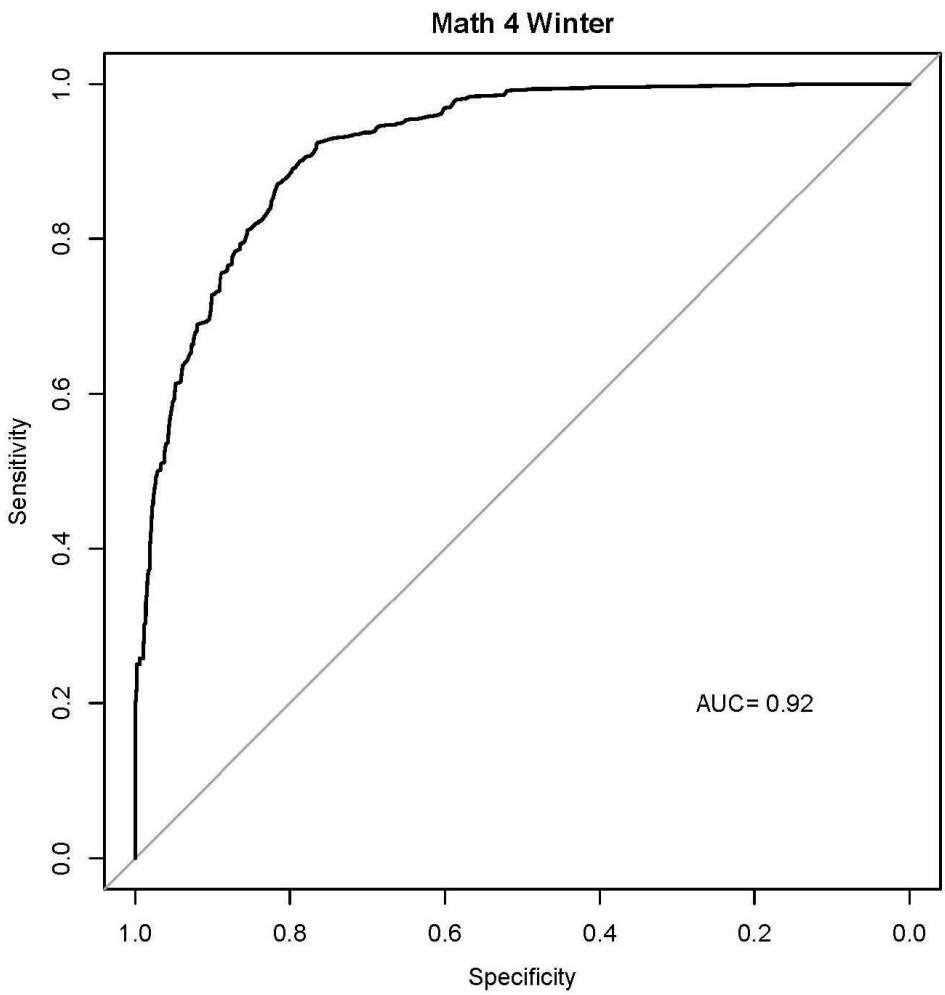

RD 8 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.891

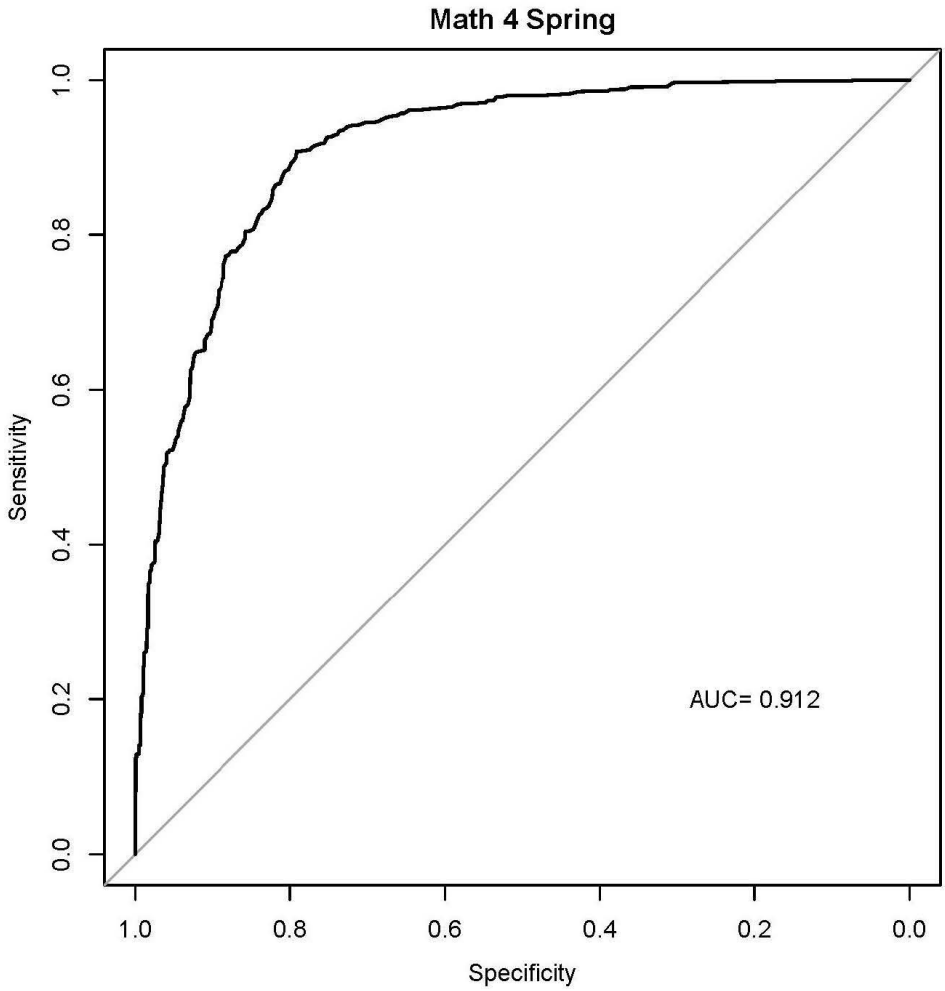

Math 3 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.893

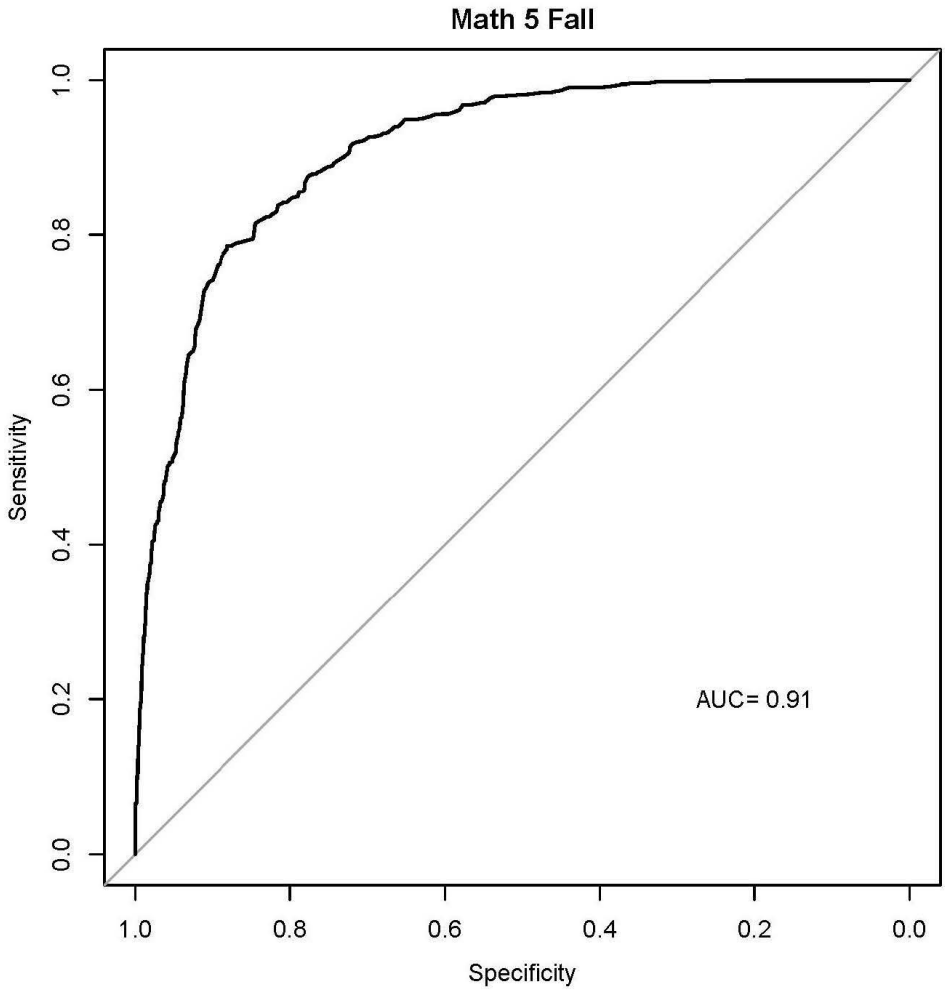

Math 3 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.904

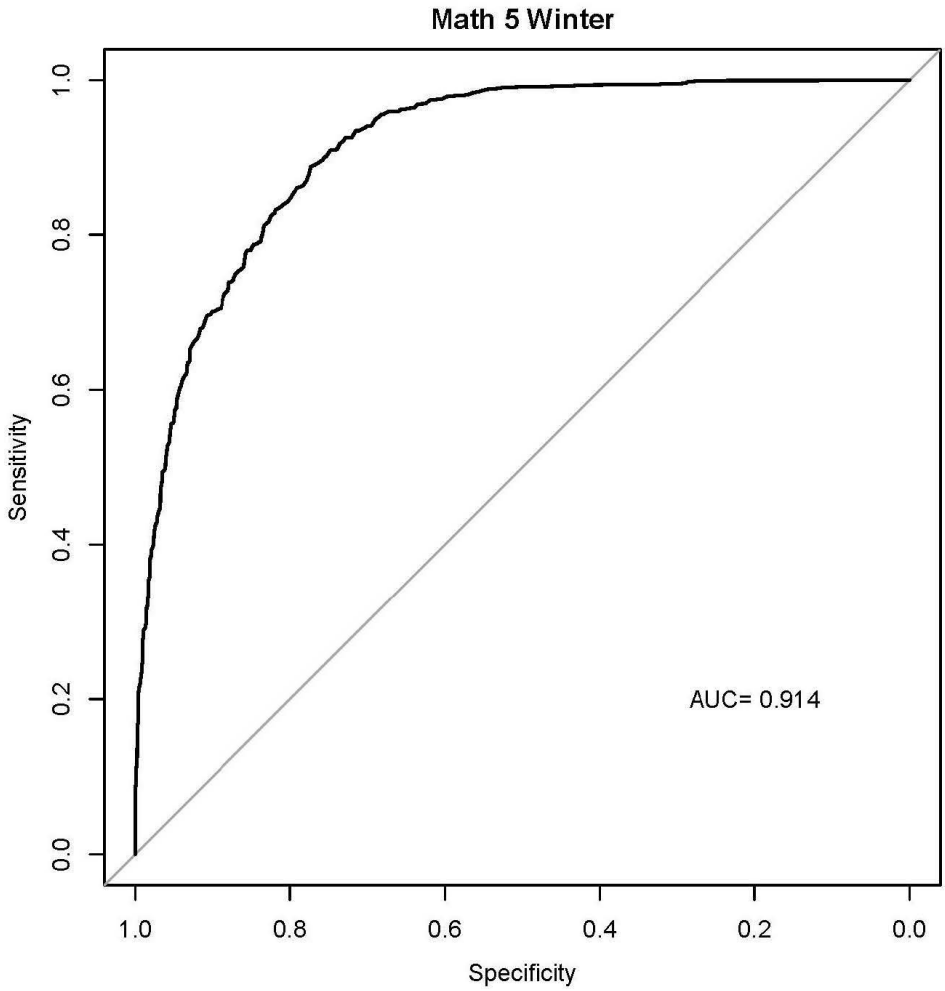

Math 3 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.886

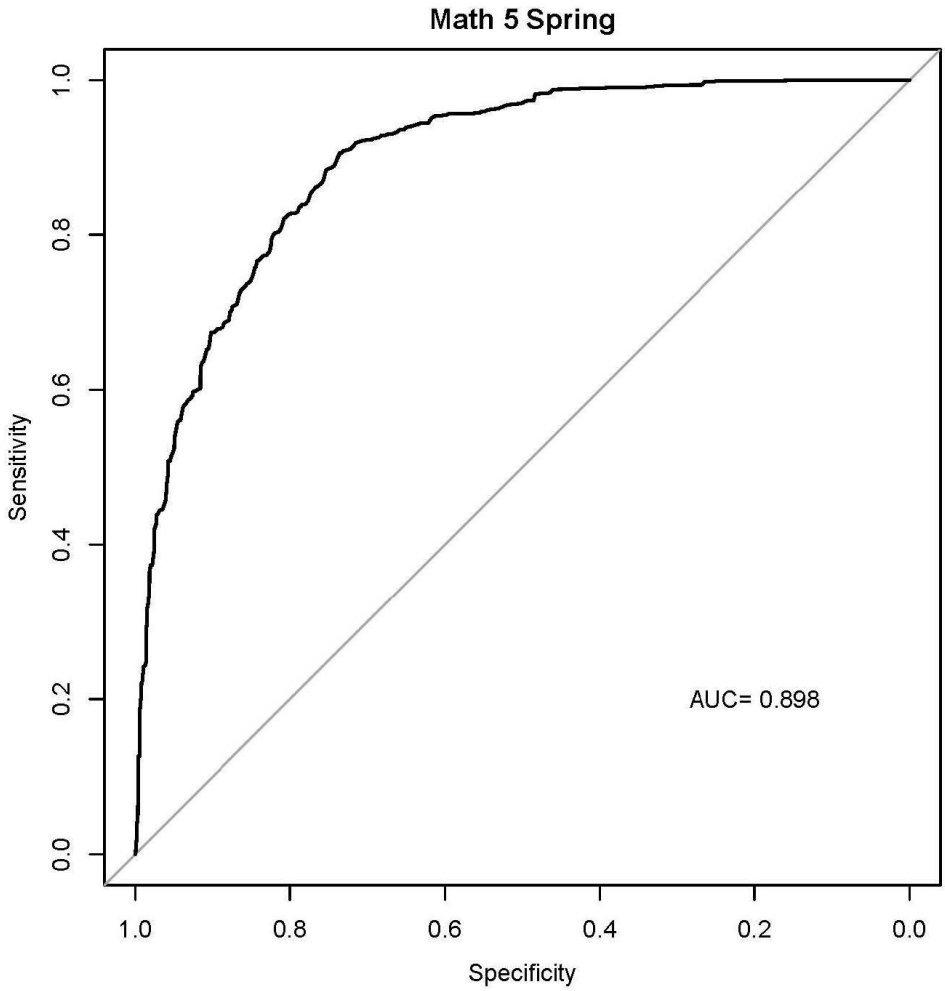

Math 4 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.885

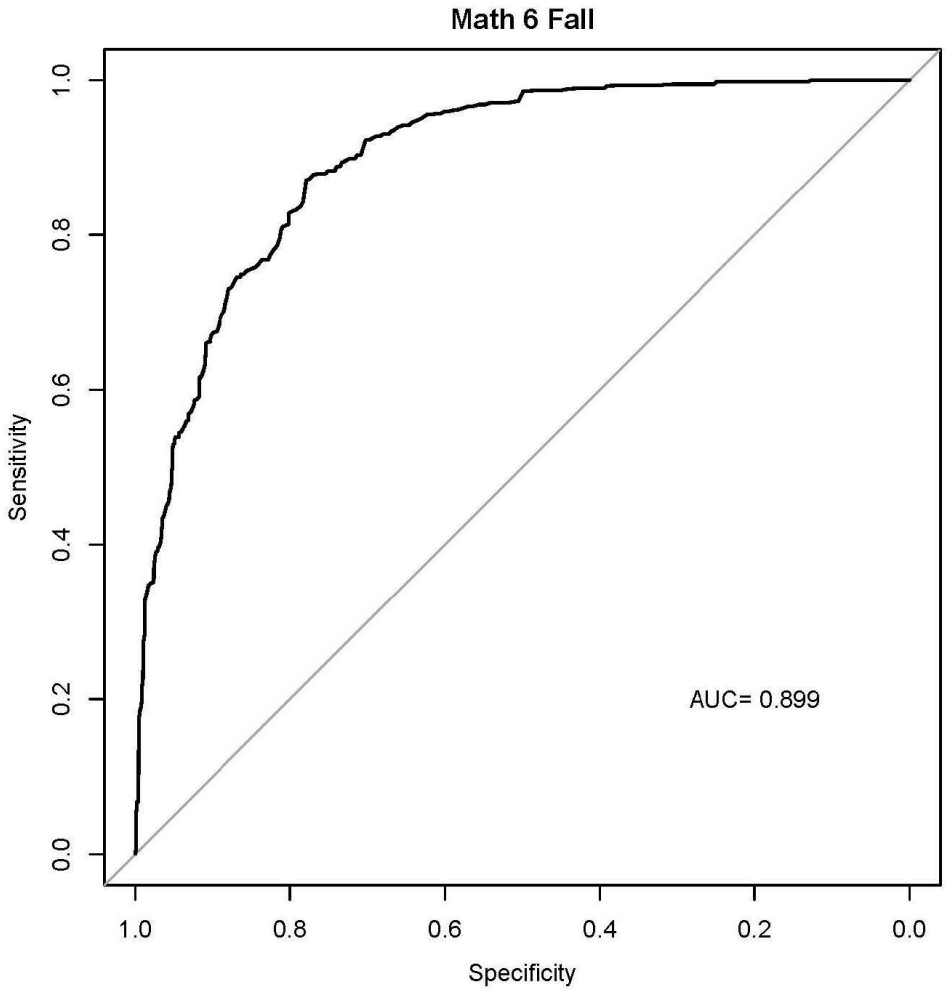

Math 4 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.92

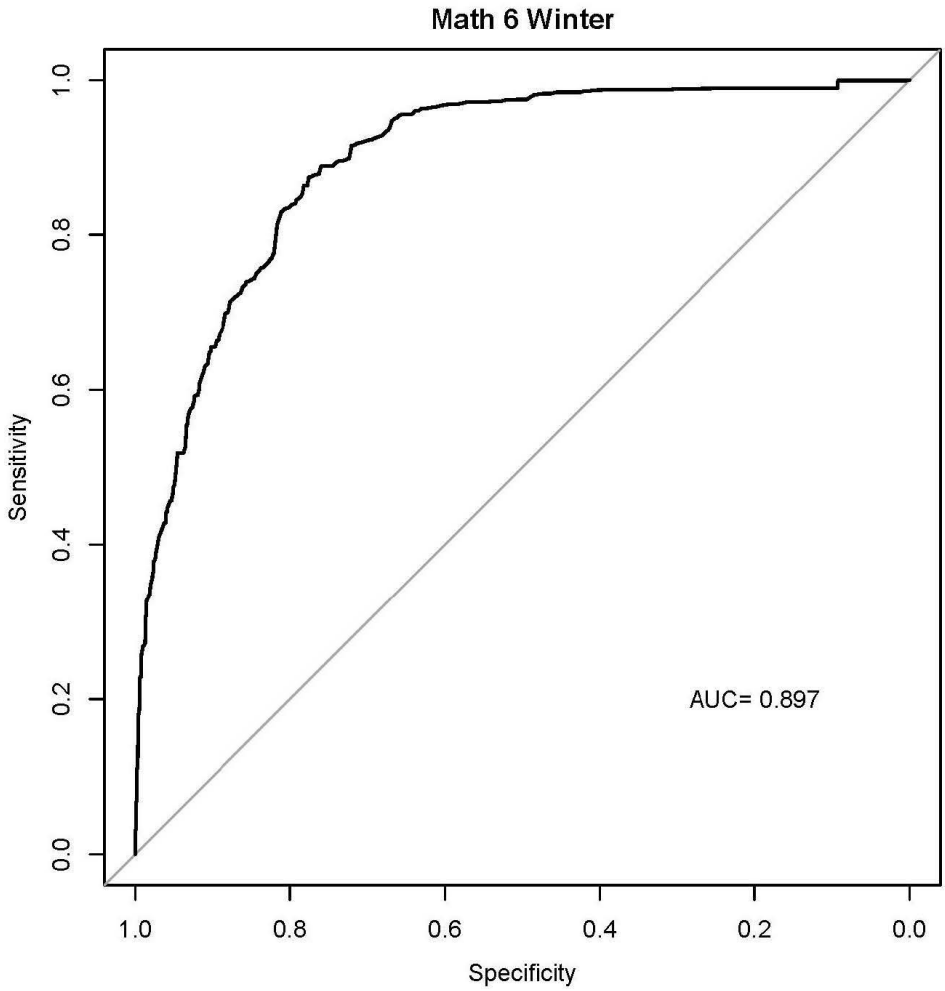

Math 4 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.912

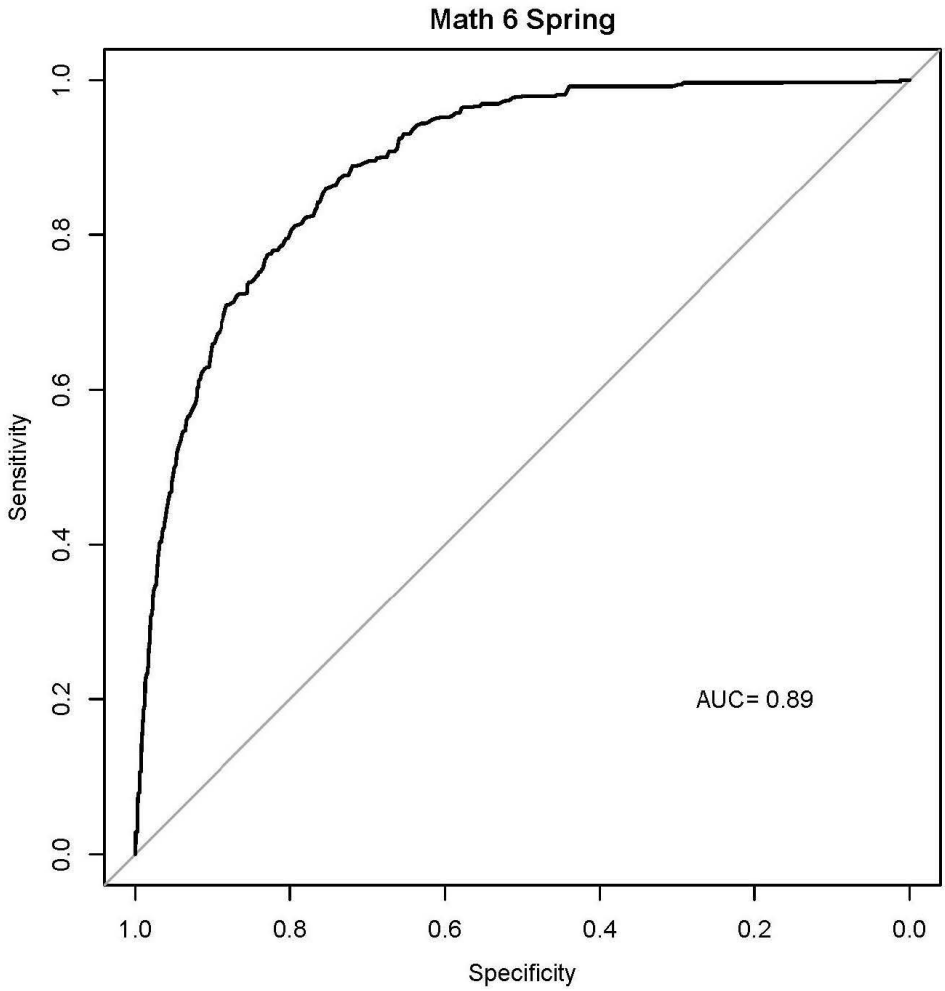

Math 5 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.91

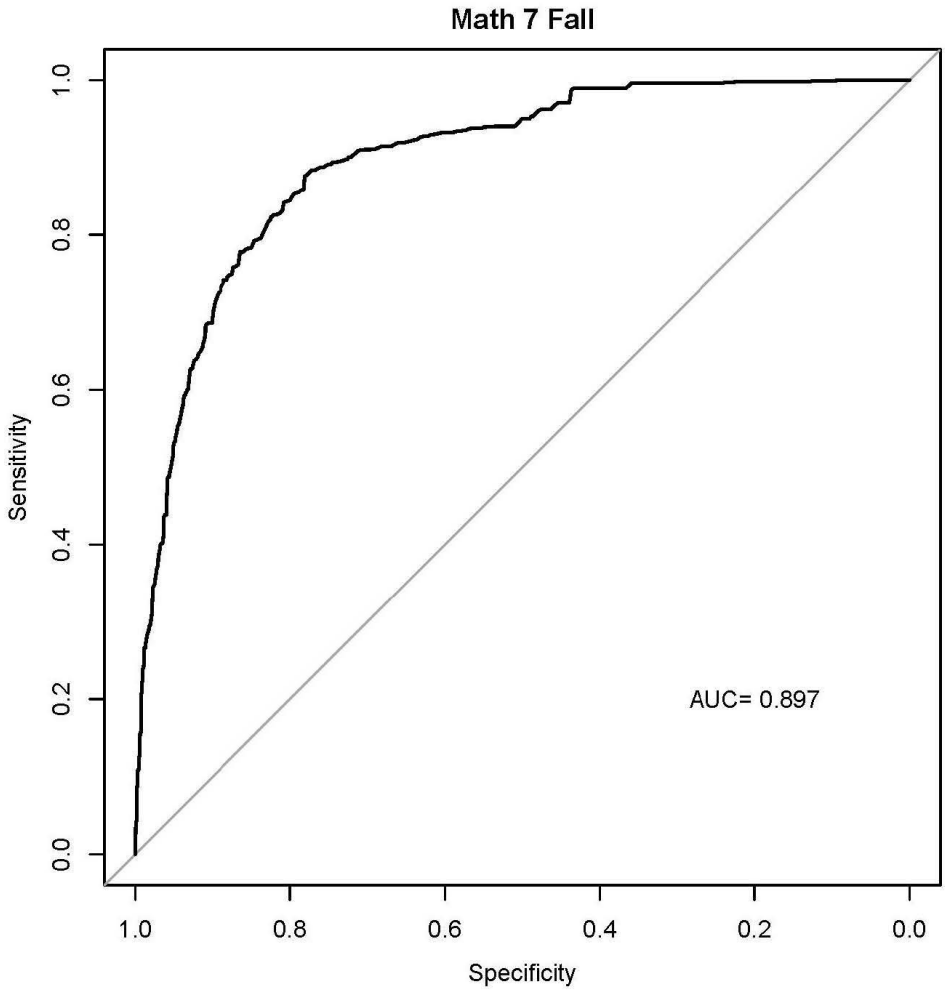

Math 5 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.914

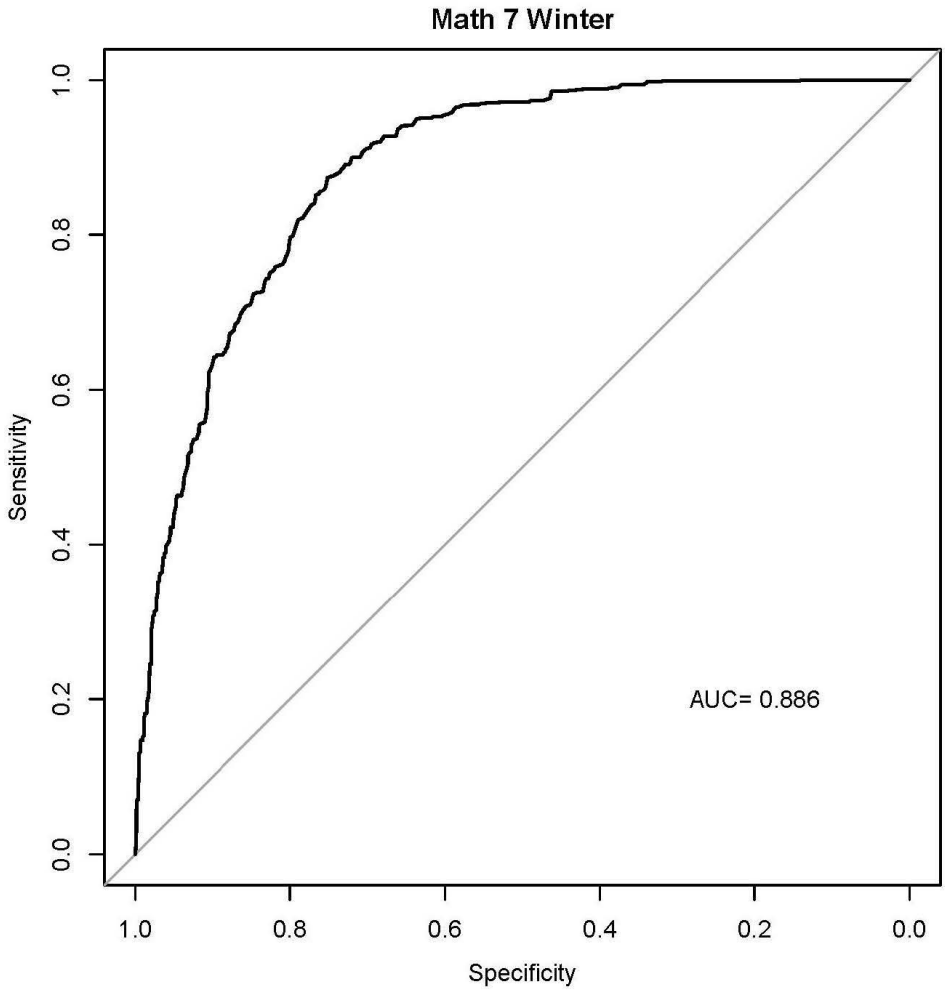

Math 5 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.898

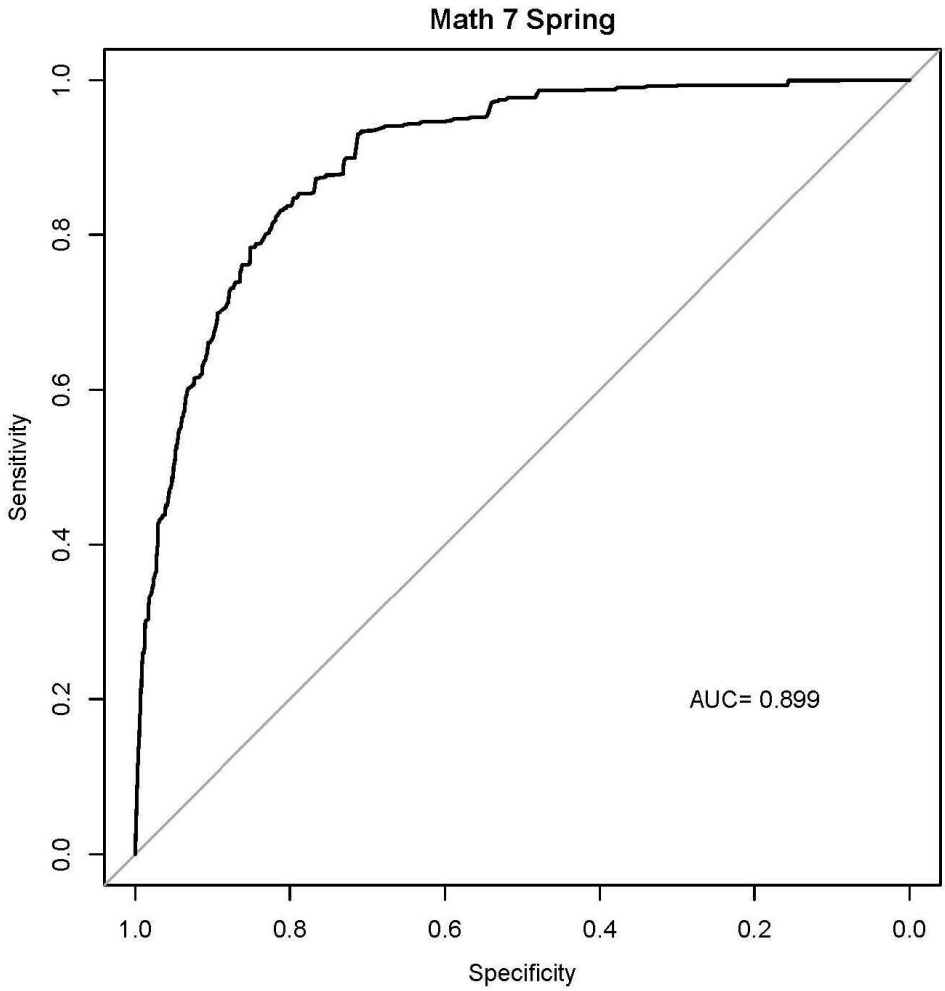

Math 6 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.899

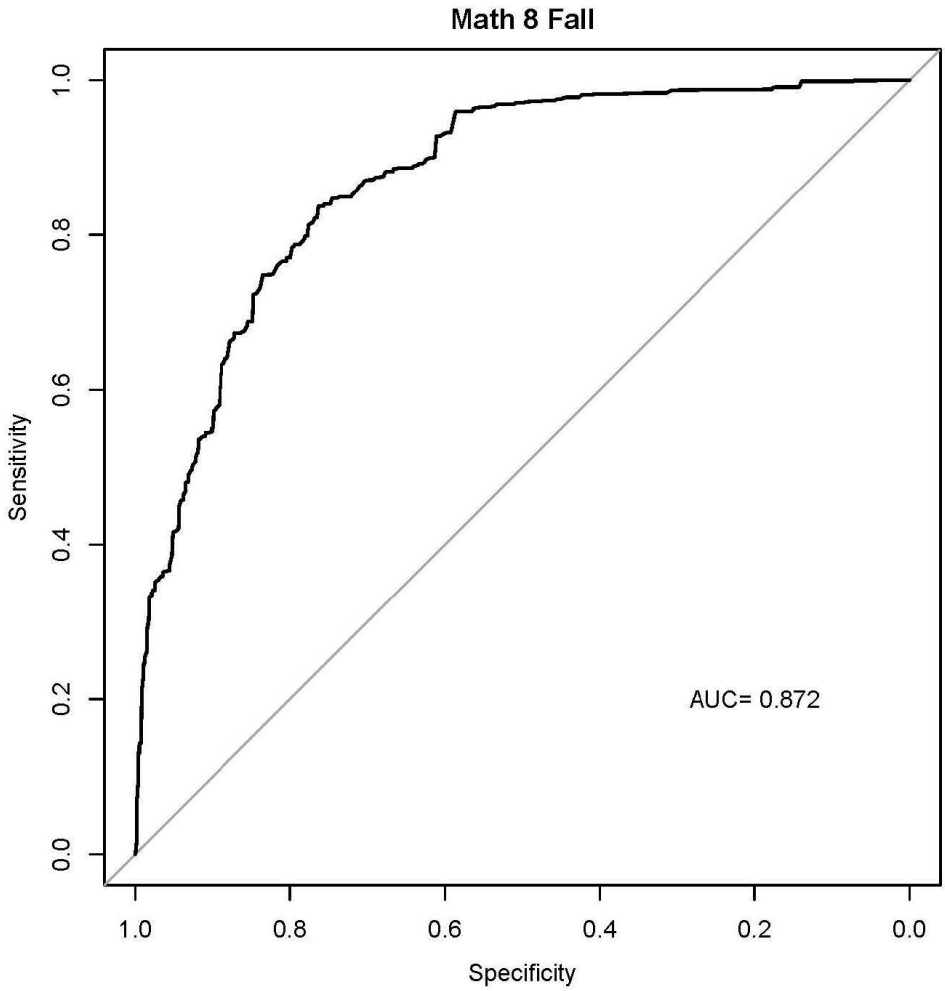

Math 6 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.897

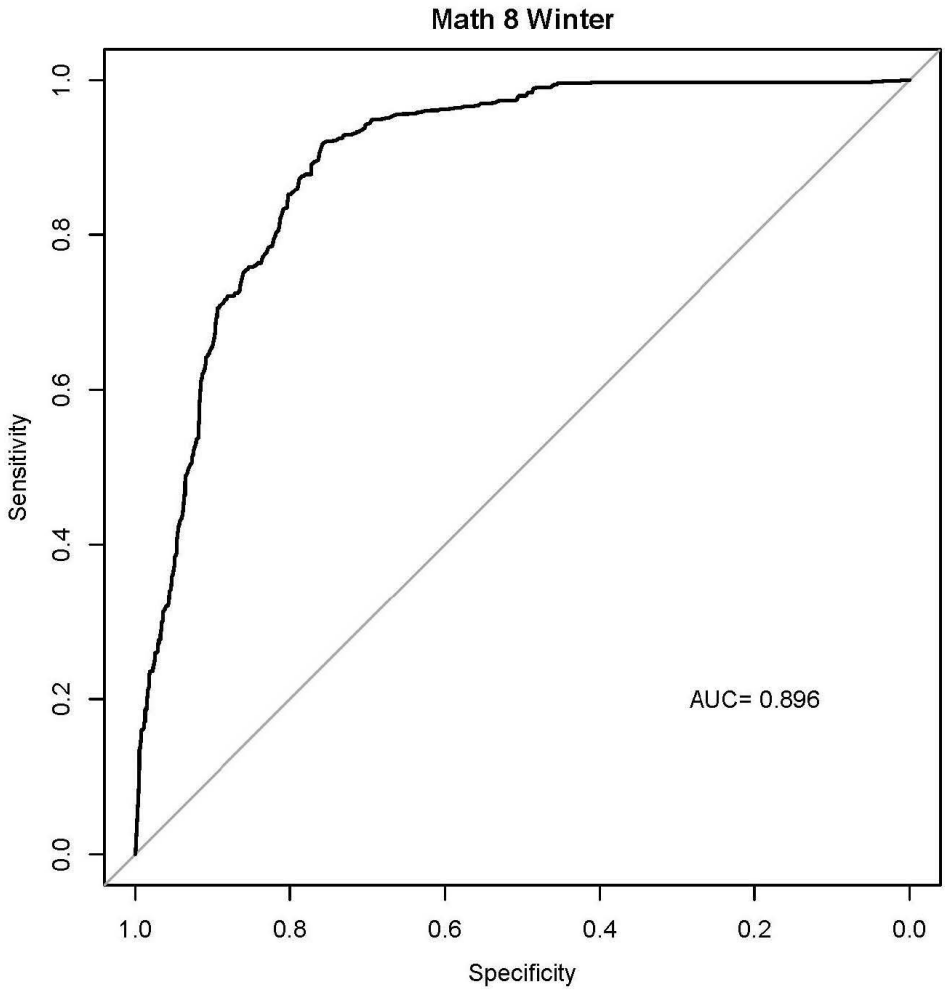

Math 6 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.89

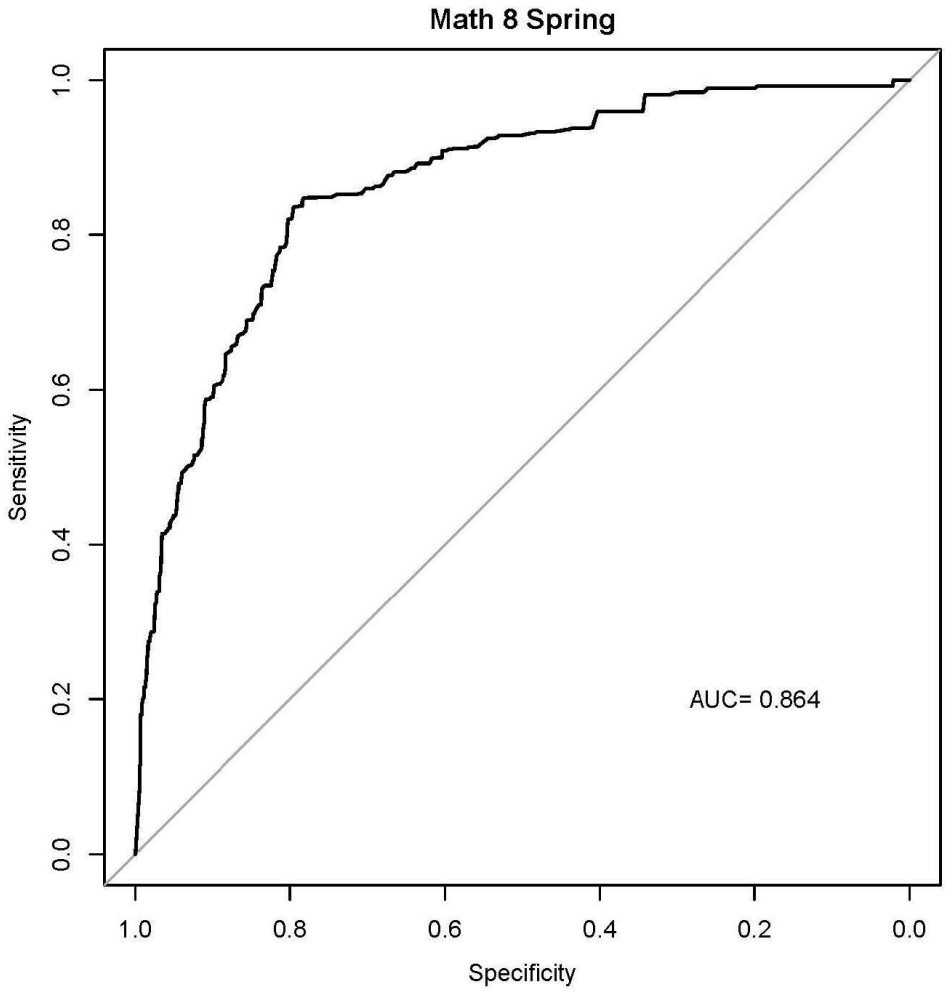

Math 7 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.897


Math 7 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.886


Math 7 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.899


Math 8 Fall
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.872


Math 8 Winter
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.896


Math 8 Spring
Sensitivity
Specificity
1.0
0.8
0.6
0.4
0.2
0.0
AUC= 0.864

Test Engagement Research

Georgia Milestones: Test Engagement Research Summary

Students' item response times were used as an indicator of examinee engagement in this study. Using Spring 2022 Georgia Milestones telemetry data, rapid guessing behavior (i.e., disengagement) was identified at item level first and then flagged at student level. The impact of the disengagement on flagged student scale scores was evaluated for both EOG and EOC Milestones tests by comparing their real scores with simulated scores based on raw scores from their responses to unflagged items and the simulated responses to items flagged for rapid guessing.

Study Methodology

Data for the study were gathered from the spring 2022 administration, including both the final state data file for the item responses and the telemetry data for the item response times. only the online forms A and B forms were included in the study. Operational data cleaning rules were applied.

The following steps were implemented in this study:

1. Identifying rapid guessing behavior at item level. Four different rules for identifying rapid guessing were identified.
    - Rule 1. Item is flagged when a student takes less than three seconds to respond. (3Second)
    - Rule 2. Item is flagged when the student takes less than 10% of the average time on the item. (NT10)
    - Rule 3. Item is flagged when the student takes less than 15% of the average time on the item. (NT15)
    - Rule 4. Item is flagged when the student takes less than 20% of the average time on the item. (NT20)

    Note: NT= Normative Threshold.
2. For each item flagging rule, we identified students with significant amounts of item level flagging. Three different sets of flagging criteria were used to identify students with non-negligible levels of disengagement.
    a. Response latency < thresholds to at least 15% of all items
    b. No more than 20% of items answered correctly AND response latency < threshold to at least 3 items in any of the 10-item rolling subsets. Note: For TE and CR items, treat item score >0.5 max item score as answered correctly
    c. Response latency < threshold on at least three items in 20% of the 10-item rolling subsets.
    d. Note that a student is flagged for significant amounts of item level flagging if they met any of these three conditions.
3. For flagged students run following analysis

A. Treat all item responses below threshold as missing.

B. Maximum Likelihood Estimation of student's score based only on items not flagged for disengagement/guessing issues.

C. Use new score and IRT parameters to simulate responses for items flagged for disengagement/guessing. This involves calculating the probability of each score point and drawing MC response from Bernoulli distribution or CR response from multinomial distribution.

D. Combine the simulated responses for flagged items and original responses for unflagged items.

E. Rescore flagged students in Step 2.

4. Evaluate the score difference between the original and scores from step 3D by Cohen's d. across forms.

   Cohen's d is defined as the difference between two means divided by a standard deviation for the data,

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s}.$$

   Jacob Cohen defined s, the pooled standard deviation, as

$$s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

   where the variance for one of the groups is defined as

$$s_1^2 = \frac{1}{n_1 - 1} \sum_{i=1}^{n_1} (x_{1,i} - \bar{x}_1)^2,$$

   The table below contains descriptors for magnitudes of d = 0.01 to 2.0, as initially suggested by Cohen.

Effect size	***d***
Very small	0.01
Small	0.20
Medium	0.50
Large	0.80
Very large	1.20
Huge	2.00

Study Results

Across the different combinations of item level and student level flagging for significant amounts of rapid guessing across items, a review of the original score distribution showed that lower performing students tended to be identified across the different rapid response conditions. Table 1 provides the mean scale scores for the state population and for the flagged students.

It is important to note that the different thresholds for flagging rapid guessing on items does ultimately translate to different numbers of students being flagged. The more liberal flagging thresholds (i.e., NT10, NT15, and NT20) tend to identify more rapid guessing behaviors across items, resulting in more students flagged for potential engagement issues. Moreover, the effect sizes in the ELA tests within those conditions tend to be larger.

When flagged student scores are "corrected" for disengagement (i.e., step 4), the effect sizes across all conditions are relatively small. Tables 1 and 2 present the descriptive statistics and associated effect sizes across all the conditions. All EOC courses show very small effect sizes (i.e., less than .20). Most EOG grades and subjects also show very small effect sizes except three cases in ELA Grade 8 which showed a small effect size.

The small effect sizes found across conditions indicate that the simulated corrected responses were equivalent to the actual responses for those flagged students. That is, when correcting student scores for rapid guessing, which is considered a proxy for disengagement within this study, the new scores are found to be consistent with their original performance. This finding suggests that the rapid guessing seen within this test administration is more likely to be a function of a student's achievement as opposed to their level of attentiveness during the assessment administration.

The results based on these analyses are quite different from what has been seen within the literature on test engagement, which shows an average effect size of 0.58 on lower-stakes assessment (Wise & DeMars, 2005). In summative testing, the prevalence of rapid guessing does not appear to be indicative of engagement for students across the full range of achievement. Relatively few students within the state population are flagged for substantial amounts of rapid guessing across all grades/subjects/courses and when those scores are corrected – these scores tend to be similar across the various conditions.

Based on TAC feedback, DRC produced a series of supplemental plots of the response time information to visually identify bimodal distributions that could help identify rapid guessing thresholds other than the four that rules that were specified within this study. However, given the size of the population of students taking each item, the response time distribution plots did not show identifiable bimodal distributions.

DRC next produced response time plots by performance level as an attempt to identify response time threshold within segments of the distributions that could potentially be used in future research. Figures 1 and 2 contain the response time by performance level plots for all items on Form A of the Algebra and Grade 5 Mathematics assessments. Note that each item is labeled by item type (i.e., MS or TE). When broken out by performance level, some bimodality in response times was seen for certain items. However, this pattern was not universal throughout this assessment.

Future research should continue to explore response time as a potential indicator of disengagement. DRC intends to confirm that the levels of rapid guessing are stable over multiple administrations. Identifying optimal thresholds and flagging criteria for use in subsequent exploratory analyses is also a secondary goal. Response time data is extensive for a statewide assessment like Milestones and it would be useful to have additional tools to help digest this information.

Reference

Wise, S. L., & DeMars, C. E. (2005). Low examinee effort in low-stakes assessment: Problems and potential solutions. Educational Assessment, 10, 1–17.

Table 1. EOG Engagement Study Result Summary

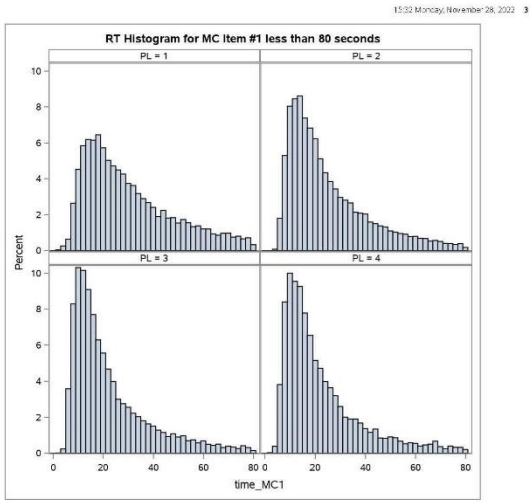
				State Score			Original Score		New Score				
Threshold	Content	Grade	Count	N	Mean	SD	Mean	SD	Mean	SD	PooledSD	EffectSize	Flag
3Second	ELA	3	413	123061	499.4	68.0	424.11	55.57	434.93	61.94	58.84	0.18	Very Small (ES>=0.01)
3Second	ELA	4	405	124346	503.5	57.8	436.34	44.63	444.71	50.79	47.81	0.18	Very Small (ES>=0.01)
3Second	ELA	5	258	126121	512.4	54.2	447.74	44.72	454.52	50.43	47.66	0.14	Very Small (ES>=0.01)
3Second	ELA	6	535	127246	506.5	67.2	421.12	45.49	426.69	52.91	49.34	0.11	Very Small (ES>=0.01)
3Second	ELA	7	755	131694	503.8	56.4	437.73	42.08	443.07	48.58	45.44	0.12	Very Small (ES>=0.01)
3Second	ELA	8	713	135107	512.6	51.0	453.54	39.47	461.96	45.31	42.49	0.2	Small (ES>=0.2)
3Second	MATH	3	375	122977	519.0	52.0	454.95	30.63	459.94	36.86	33.89	0.15	Very Small (ES>=0.01)
3Second	MATH	4	291	124248	519.7	55.9	451.14	31.08	455.36	36.33	33.81	0.13	Very Small (ES>=0.01)
3Second	MATH	5	495	126061	510.5	59.4	449.09	32.34	454.95	37.57	35.05	0.17	Very Small (ES>=0.01)
3Second	MATH	6	546	127117	503.7	51.9	446.20	27.27	449.98	32.17	29.82	0.13	Very Small (ES>=0.01)
3Second	MATH	7	753	131584	512.3	54.6	453.67	25.40	457.80	29.96	27.78	0.15	Very Small (ES>=0.01)
3Second	MATH	8	507	134799	510.1	56.5	441.01	22.56	442.72	26.15	24.42	0.07	Very Small (ES>=0.01)
3Second	PHSC	8	215	38142	534.4	70.3	425.14	35.62	431.76	42.66	39.30	0.17	Very Small (ES>=0.01)
3Second	SCI	5	668	125802	510.0	69.1	438.34	44.36	444.53	52.35	48.52	0.13	Very Small (ES>=0.01)
3Second	SCI	8	700	96141	491.4	62.6	414.77	28.69	417.01	35.08	32.04	0.07	Very Small (ES>=0.01)
3Second	SOCS	8	804	134035	509.5	51.6	432.15	23.06	432.83	26.69	24.94	0.03	Very Small (ES>=0.01)
NT10	ELA	3	5268	123061	499.4	68.0	411.88	37.32	417.04	43.08	40.30	0.13	Very Small (ES>=0.01)
NT10	ELA	4	5266	124346	503.5	57.8	427.87	33.77	431.71	39.01	36.48	0.11	Very Small (ES>=0.01)
NT10	ELA	5	3858	126121	512.4	54.2	434.38	35.11	437.01	40.27	37.78	0.07	Very Small (ES>=0.01)
NT10	ELA	6	6671	127246	506.5	67.2	417.74	39.10	423.61	44.68	41.98	0.14	Very Small (ES>=0.01)
NT10	ELA	7	8220	131694	503.8	56.4	435.70	34.40	441.17	40.90	37.79	0.14	Very Small (ES>=0.01)
NT10	ELA	8	6225	135107	512.6	51.0	444.61	31.32	451.62	37.47	34.53	0.2	Small (ES>=0.2)
NT10	MATH	3	3399	122977	519.0	52.0	453.11	24.58	453.65	29.90	27.37	0.02	Very Small (ES>=0.01)
NT10	MATH	4	2990	124248	519.7	55.9	448.00	24.49	448.82	29.43	27.07	0.03	Very Small (ES>=0.01)
NT10	MATH	5	3624	126061	510.5	59.4	443.54	25.72	445.45	30.70	28.32	0.07	Very Small (ES>=0.01)
NT10	MATH	6	4881	127117	503.7	51.9	447.16	22.49	447.46	27.70	25.23	0.01	Very Small (ES>=0.01)
NT10	MATH	7	6420	131584	512.3	54.6	457.53	22.34	460.74	27.97	25.31	0.13	Very Small (ES>=0.01)
NT10	MATH	8	6372	134799	510.1	56.5	447.41	23.45	444.80	29.39	26.59	0.1	Very Small (ES>=0.01)
NT10	PHSC	8	2217	38142	534.4	70.3	434.43	33.37	438.81	42.69	38.31	0.11	Very Small (ES>=0.01)
NT10	SCI	5	6002	125802	510.0	69.1	432.97	36.58	435.46	44.46	40.71	0.06	Very Small (ES>=0.01)
NT10	SCI	8	7331	96141	491.4	62.6	426.75	30.45	427.51	38.84	34.90	0.02	Very Small (ES>=0.01)
NT10	SOCS	8	3778	134035	509.5	51.6	438.47	24.69	437.21	29.87	27.40	0.05	Very Small (ES>=0.01)
NT15	ELA	3	10380	123061	499.4	68.0	416.90	37.49	422.11	44.16	40.96	0.13	Very Small (ES>=0.01)

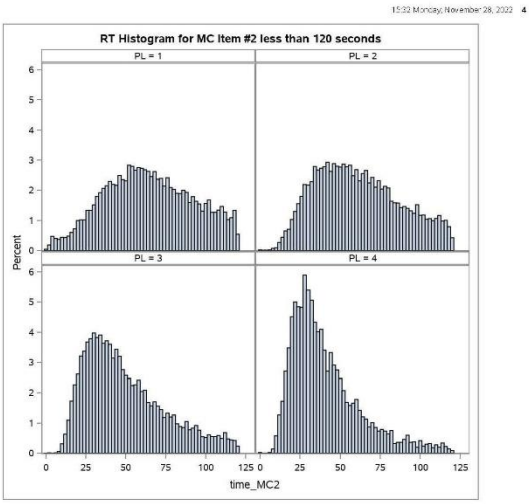
				State Score			Original Score		New Score				
Threshold	Content	Grade	Count	N	Mean	SD	Mean	SD	Mean	SD	PooledSD	EffectSize	Flag
NT15	ELA	4	9972	124346	503.5	57.8	433.34	34.64	438.41	40.40	37.63	0.13	Very Small (ES>=0.01)
NT15	ELA	5	7085	126121	512.4	54.2	440.79	37.66	443.86	43.02	40.43	0.08	Very Small (ES>=0.01)
NT15	ELA	6	11120	127246	506.5	67.2	424.99	42.45	431.14	48.67	45.67	0.13	Very Small (ES>=0.01)
NT15	ELA	7	12439	131694	503.8	56.4	439.56	34.94	446.44	41.49	38.36	0.18	Very Small (ES>=0.01)
NT15	ELA	8	9583	135107	512.6	51.0	449.64	34.25	458.02	39.36	36.89	0.23	Small (ES>=0.2)
NT15	MATH	3	6953	122977	519.0	52.0	458.05	28.91	459.01	33.31	31.19	0.03	Very Small (ES>=0.01)
NT15	MATH	4	5923	124248	519.7	55.9	451.85	27.11	453.57	32.31	29.83	0.06	Very Small (ES>=0.01)
NT15	MATH	5	6506	126061	510.5	59.4	446.07	27.01	448.29	31.96	29.59	0.07	Very Small (ES>=0.01)
NT15	MATH	6	8258	127117	503.7	51.9	449.49	23.08	450.21	28.50	25.93	0.03	Very Small (ES>=0.01)
NT15	MATH	7	10010	131584	512.3	54.6	459.78	22.56	463.87	28.88	25.91	0.16	Very Small (ES>=0.01)
NT15	MATH	8	9878	134799	510.1	56.5	450.50	25.83	448.97	32.28	29.23	0.05	Very Small (ES>=0.01)
NT15	PHSC	8	3130	38142	534.4	70.3	437.89	34.06	443.48	44.27	39.50	0.14	Very Small (ES>=0.01)
NT15	SCI	5	10174	125802	510.0	69.1	434.92	36.00	437.91	44.58	40.52	0.07	Very Small (ES>=0.01)
NT15	SCI	8	11253	96141	491.4	62.6	430.23	31.31	431.65	41.09	36.53	0.04	Very Small (ES>=0.01)
NT15	SOCS	8	6606	134035	509.5	51.6	441.86	26.20	440.55	33.80	30.24	0.04	Very Small (ES>=0.01)
NT20	ELA	3	15512	123061	499.4	68.0	427.69	48.98	433.09	54.12	51.61	0.1	Very Small (ES>=0.01)
NT20	ELA	4	15092	124346	503.5	57.8	444.52	46.02	449.92	49.95	48.03	0.11	Very Small (ES>=0.01)
NT20	ELA	5	11563	126121	512.4	54.2	457.09	51.33	460.18	54.55	52.97	0.06	Very Small (ES>=0.01)
NT20	ELA	6	16738	127246	506.5	67.2	442.23	57.16	448.31	60.64	58.93	0.1	Very Small (ES>=0.01)
NT20	ELA	7	16690	131694	503.8	56.4	445.77	39.48	453.04	45.02	42.34	0.17	Very Small (ES>=0.01)
NT20	ELA	8	14148	135107	512.6	51.0	462.60	45.38	470.54	47.06	46.23	0.17	Very Small (ES>=0.01)
NT20	MATH	3	11965	122977	519.0	52.0	470.78	44.19	471.82	46.75	45.49	0.02	Very Small (ES>=0.01)
NT20	MATH	4	9646	124248	519.7	55.9	459.87	37.25	462.25	41.21	39.28	0.06	Very Small (ES>=0.01)
NT20	MATH	5	9930	126061	510.5	59.4	451.66	34.62	454.04	38.78	36.76	0.06	Very Small (ES>=0.01)
NT20	MATH	6	11904	127117	503.7	51.9	453.90	28.37	455.23	33.45	31.01	0.04	Very Small (ES>=0.01)
NT20	MATH	7	13719	131584	512.3	54.6	463.52	27.22	467.68	32.58	30.02	0.14	Very Small (ES>=0.01)
NT20	MATH	8	14153	134799	510.1	56.5	458.21	36.65	457.41	41.82	39.32	0.02	Very Small (ES>=0.01)
NT20	PHSC	8	3945	38142	534.4	70.3	442.32	35.81	448.44	46.01	41.23	0.15	Very Small (ES>=0.01)
NT20	SCI	5	13697	125802	510.0	69.1	437.03	36.41	440.29	45.43	41.17	0.08	Very Small (ES>=0.01)
NT20	SCI	8	14294	96141	491.4	62.6	433.17	32.81	435.09	42.87	38.17	0.05	Very Small (ES>=0.01)
NT20	SOCS	8	9444	134035	509.5	51.6	449.01	35.58	447.88	41.42	38.61	0.03	Very Small (ES>=0.01)

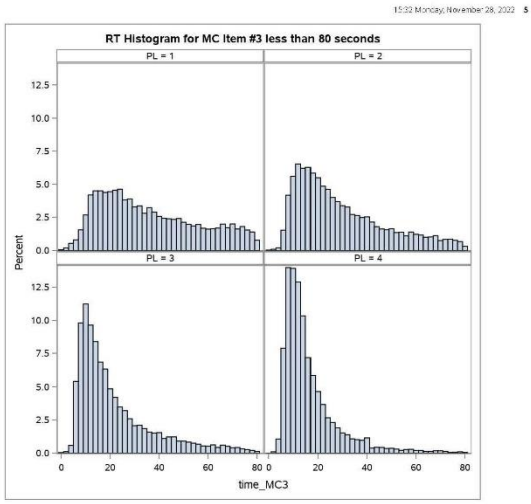
Table 2. EOC Engagement Study Result Summary

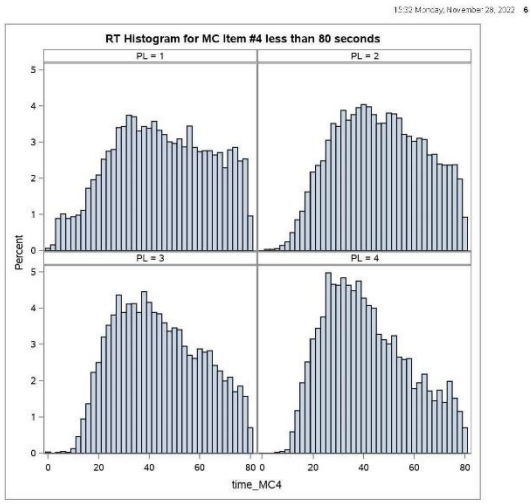
			State Score			Original Score		New Score				
Threshold	Course	Count	N	Mean	SD	Mean	SD	Mean	SD	PooledSD	EffectSize	Flag
3Second	ALG1	336	115807	513.1	66.7	425.17	26.18	425.65	31.01	28.69	0.02	Very Small (ES>=0.01)
3Second	AMLC	81	95707	512.1	52.5	426.94	29.95	432.28	34.84	32.49	0.16	Very Small (ES>=0.01)
3Second	BIOL	453	100901	523.8	74.9	428.72	34.46	429.74	40.00	37.34	0.03	Very Small (ES>=0.01)
3Second	CALG	45	12272	497.5	58.9	429.07	21.37	427.42	24.57	23.02	0.07	Very Small (ES>=0.01)
3Second	HIST	228	71958	511.2	57.2	436.40	24.25	438.73	28.71	26.57	0.09	Very Small (ES>=0.01)
NT10	ALG1	5028	115807	513.1	66.7	437.66	27.06	437.44	34.94	31.25	0.01	Very Small (ES>=0.01)
NT10	AMLC	2072	95707	512.1	52.5	440.12	35.75	445.76	39.10	37.46	0.15	Very Small (ES>=0.01)
NT10	BIOL	4689	100901	523.8	74.9	434.73	33.80	437.70	43.86	39.16	0.08	Very Small (ES>=0.01)
NT10	CALG	436	12272	497.5	58.9	437.95	24.23	434.75	31.72	28.22	0.11	Very Small (ES>=0.01)
NT10	HIST	1435	71958	511.2	57.2	436.37	24.19	438.14	29.68	27.07	0.07	Very Small (ES>=0.01)
NT15	ALG1	8089	115807	513.1	66.7	442.51	29.77	442.90	37.70	33.96	0.01	Very Small (ES>=0.01)
NT15	AMLC	3915	95707	512.1	52.5	461.17	52.44	466.44	52.99	52.72	0.10	Very Small (ES>=0.01)
NT15	BIOL	7242	100901	523.8	74.9	438.64	35.14	442.00	44.91	40.32	0.08	Very Small (ES>=0.01)
NT15	CALG	701	12272	497.5	58.9	441.51	25.01	440.58	32.93	29.24	0.03	Very Small (ES>=0.01)
NT15	HIST	2318	71958	511.2	57.2	439.39	26.77	442.32	32.85	29.97	0.10	Very Small (ES>=0.01)
NT20	ALG1	11797	115807	513.1	66.7	450.00	36.60	450.91	43.52	40.21	0.02	Very Small (ES>=0.01)
NT20	AMLC	8847	95707	512.1	52.5	494.07	60.20	496.72	58.88	59.55	0.04	Very Small (ES>=0.01)
NT20	BIOL	9773	100901	523.8	74.9	443.67	39.19	446.93	48.52	44.10	0.07	Very Small (ES>=0.01)
NT20	CALG	1050	12272	497.5	58.9	448.40	31.54	447.90	38.99	35.46	0.01	Very Small (ES>=0.01)
NT20	HIST	3276	71958	511.2	57.2	447.03	38.90	449.31	42.83	40.91	0.06	Very Small (ES>=0.01)

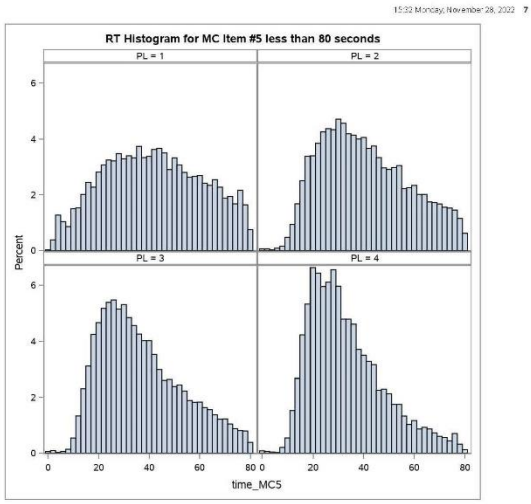
Figure 1: Histograms of Testing Time by Item and Performance Level for ALG1 Form A

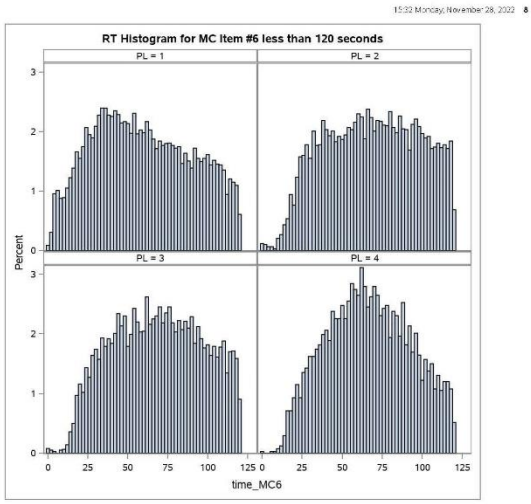

15:32 Monday, November 28, 2022 3
RT Histogram for MC Item #1 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC1

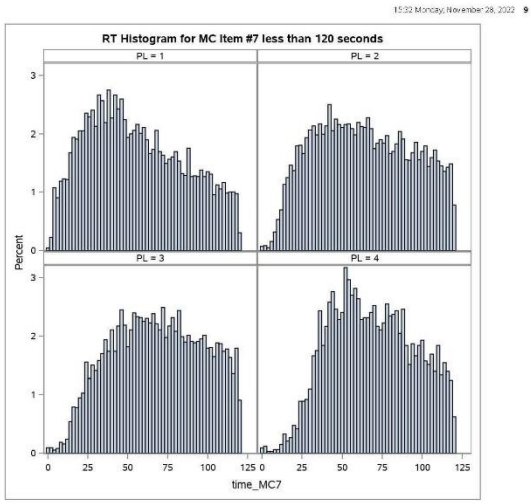

15:32 Monday, November 28, 2022 4
RT Histogram for MC Item #2 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC2

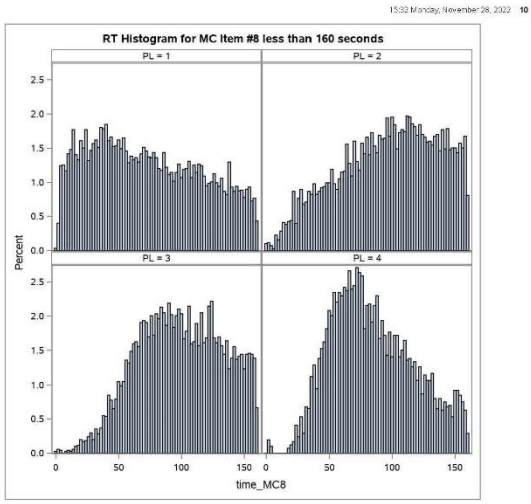

15:32 Monday, November 28, 2022 5
RT Histogram for MC Item #3 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
12.5
10.0
7.5
5.0
2.5
0.0
0
20
40
60
80
time_MC3

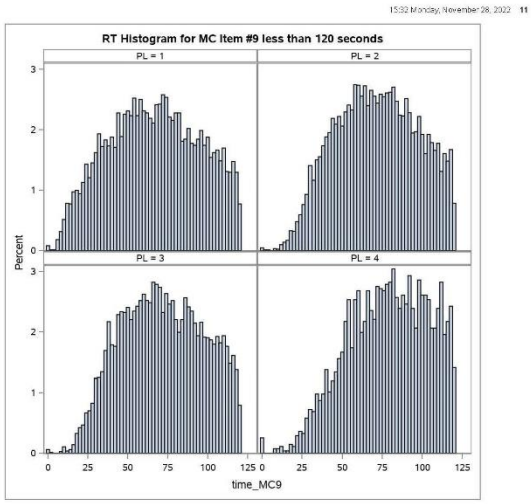

15:32 Monday, November 28, 2022 6
RT Histogram for MC Item #4 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC4

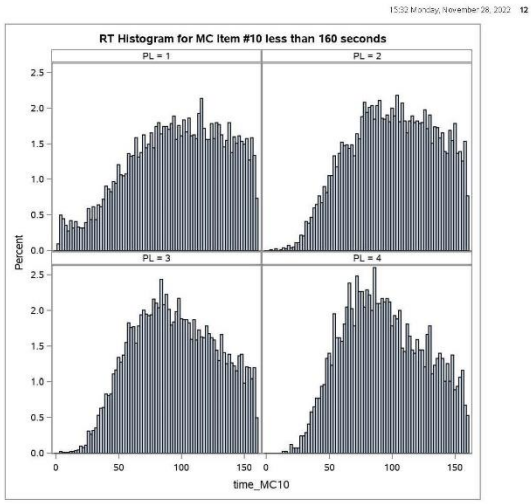

15:32 Monday, November 28, 2022 7
RT Histogram for MC Item #5 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
0
20
40
60
80
time_MC5

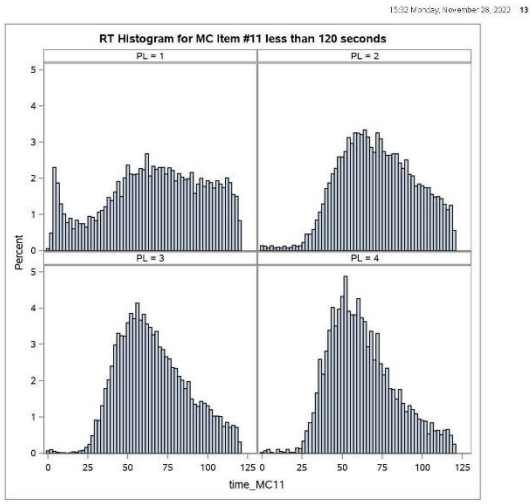

15:32 Monday, November 28, 2022 8
RT Histogram for MC item #6 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC6

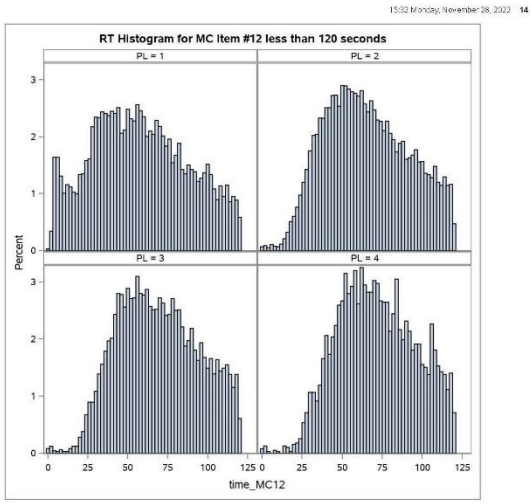

15:32 Monday, November 28, 2022 9
RT Histogram for MC Item #7 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC7

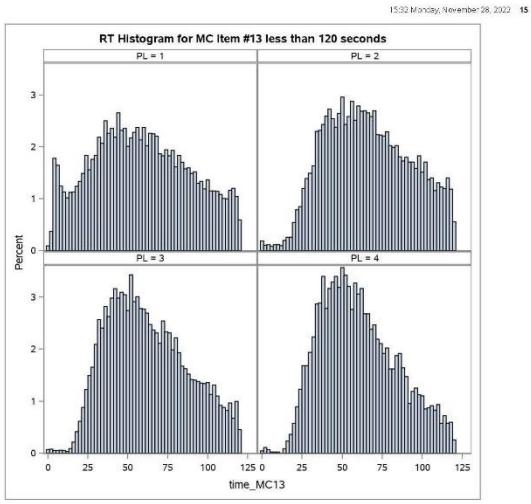

15:32 Monday, November 28, 2022 10
RT Histogram for MC Item #8 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC8

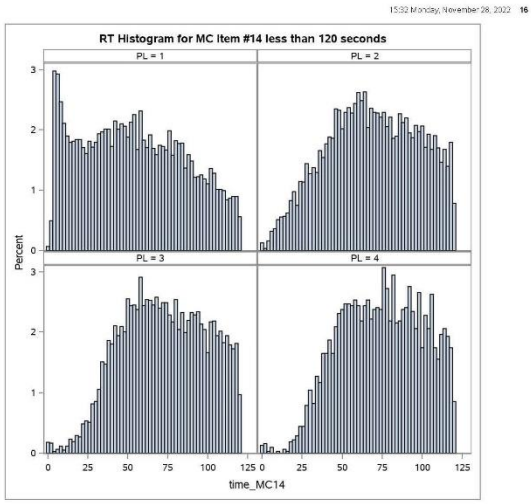

15:32 Monday, November 28, 2022 11
RT Histogram for MC Item #9 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC9

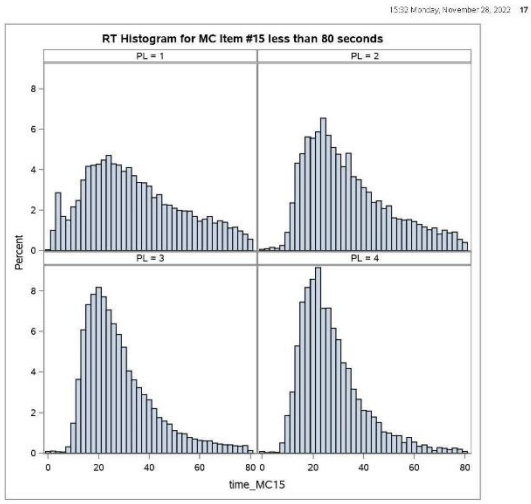

15:32 Monday, November 28, 2022 12
RT Histogram for MC Item #10 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC10

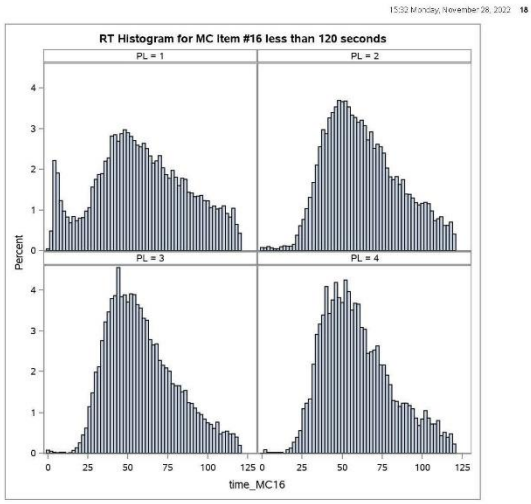

15:32 Monday, November 28, 2022 13
RT Histogram for MC Item #11 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC11

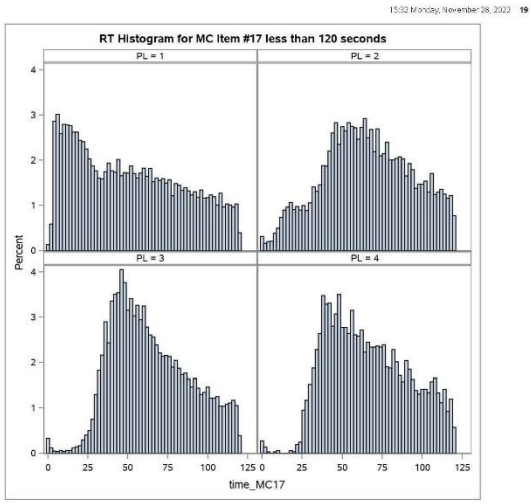

15:32 Monday, November 28, 2022 14
RT Histogram for MC Item #12 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC12

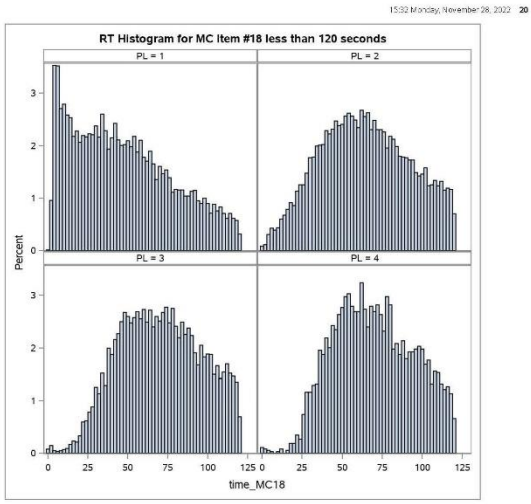

15:32 Monday, November 28, 2022 15
RT Histogram for MC Item #13 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC13

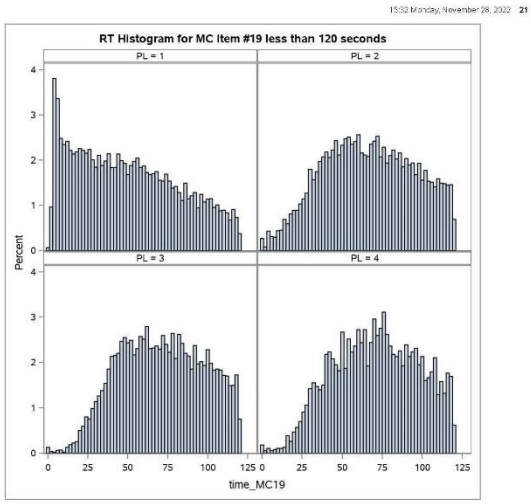

15:32 Monday, November 28, 2022 16
RT Histogram for MC Item #14 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC14

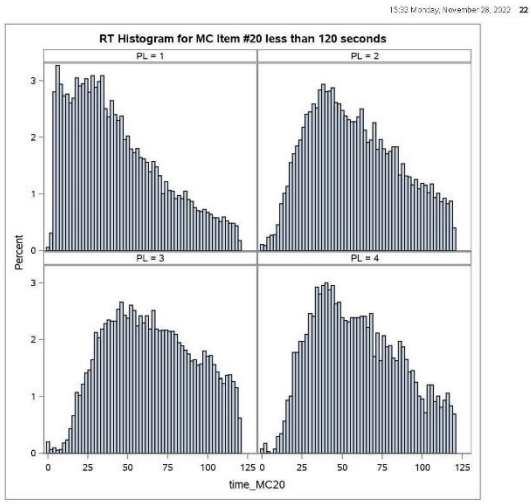

15:32 Monday, November 28, 2022 17
RT Histogram for MC Item #15 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
8
0
20
40
60
80
time_MC15

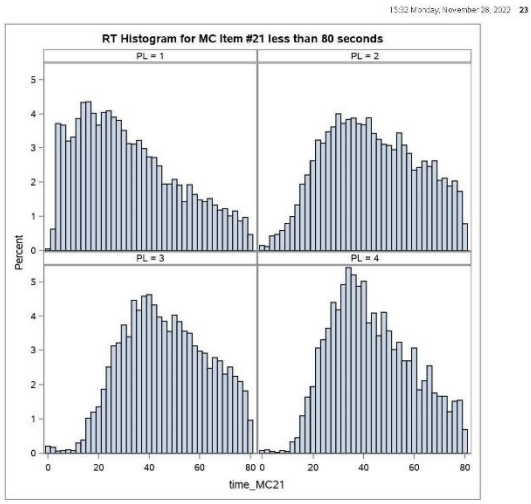

15:32 Monday, November 28, 2022 18
RT Histogram for MC Item #16 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC16

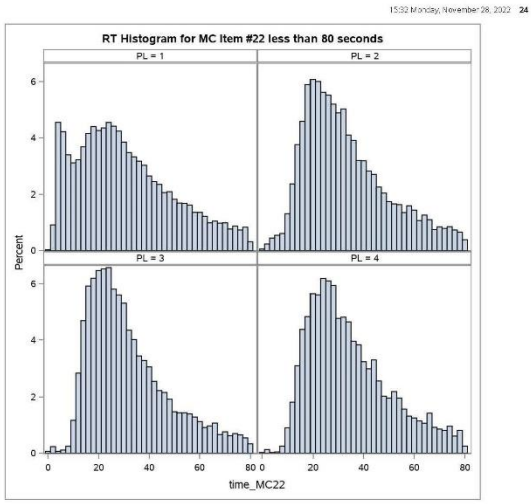

15:32 Monday, November 28, 2022 19
RT Histogram for MC Item #17 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC17


15:32 Monday, November 28, 2022 20
RT Histogram for MC Item #18 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC18

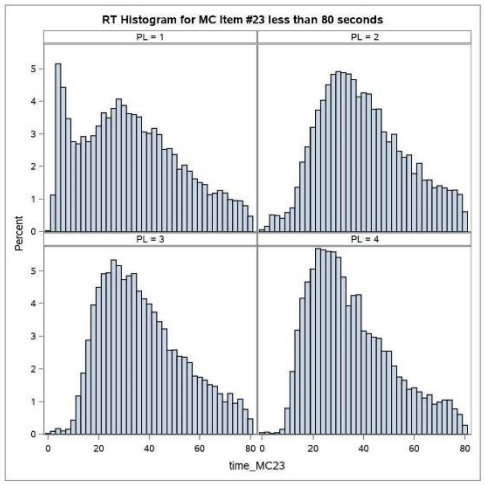

15:32 Monday, November 28, 2022 21
RT Histogram for MC Item #19 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC19

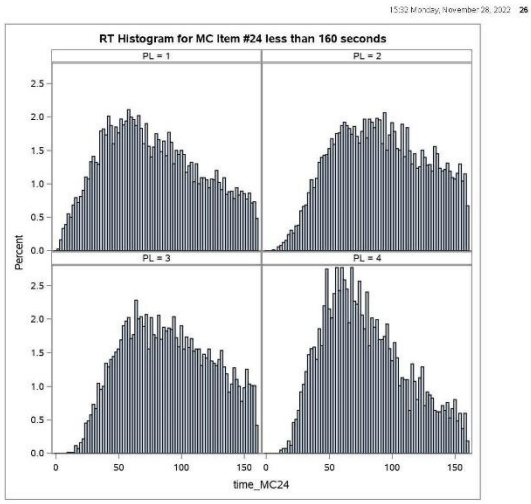

15:32 Monday, November 28, 2022 22
RT Histogram for MC Item #20 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC20

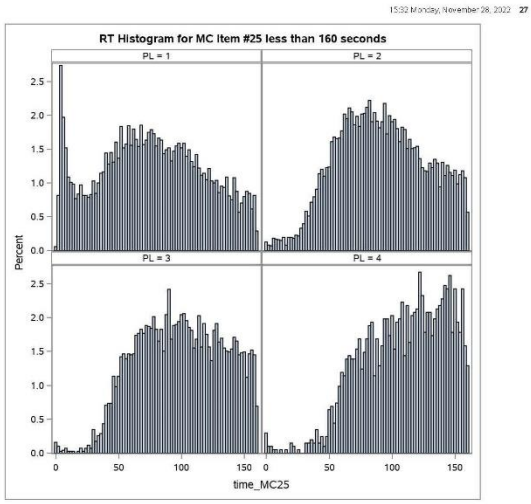

15:32 Monday, November 28, 2022 23
RT Histogram for MC item #21 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC21

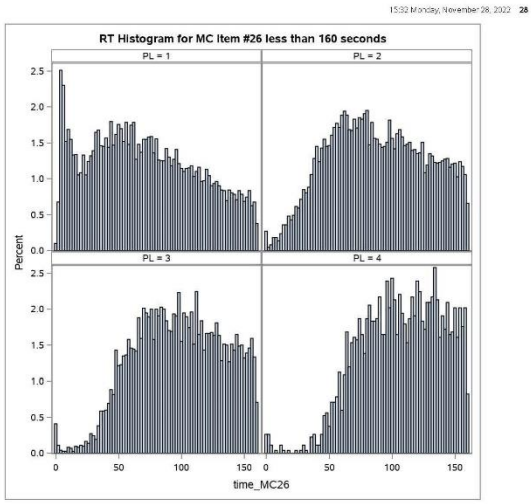

15:32 Monday, November 28, 2022 24
RT Histogram for MC item #22 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
0
20
40
60
80
time_MC22

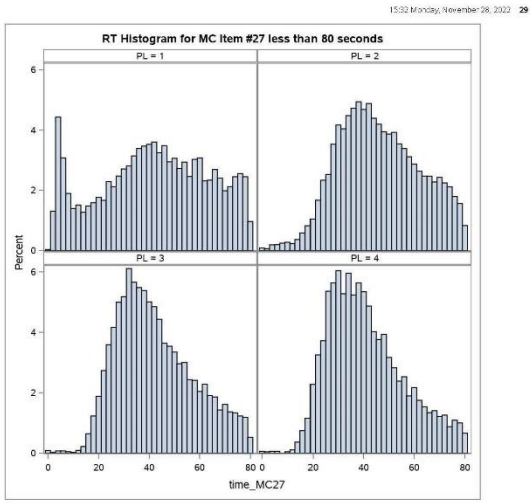
15:32 Monday, November 28, 2022 25

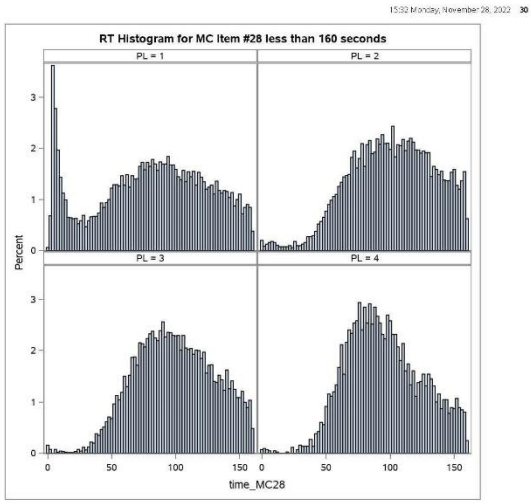


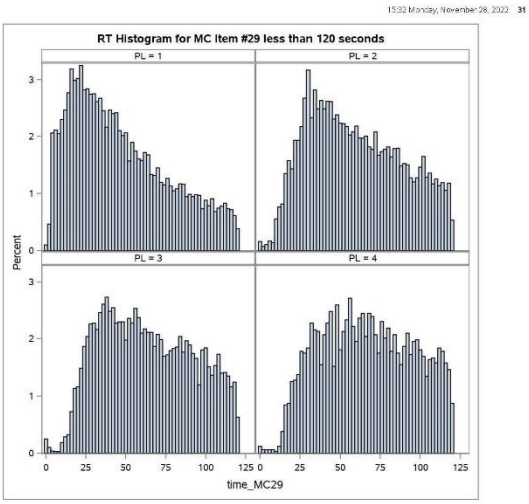

15:32 Monday, November 28, 2022 26
RT Histogram for MC Item #24 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC24

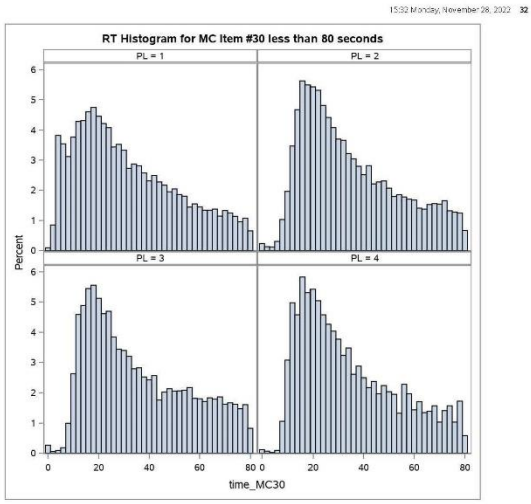

15:32 Monday, November 28, 2022 27
RT Histogram for MC Item #25 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC25


15:32 Monday, November 28, 2022 28
RT Histogram for MC Item #26 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC26

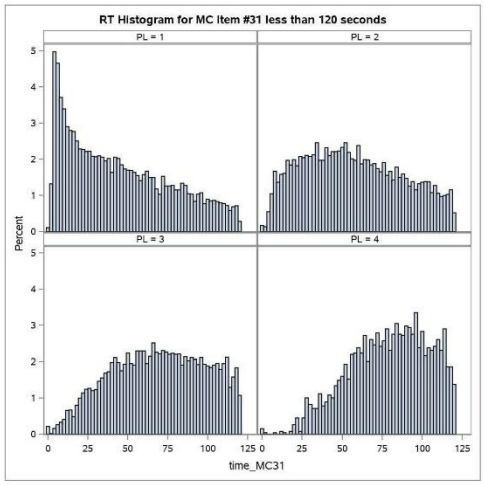

15:32 Monday, November 28, 2022 29
RT Histogram for MC item #27 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC27

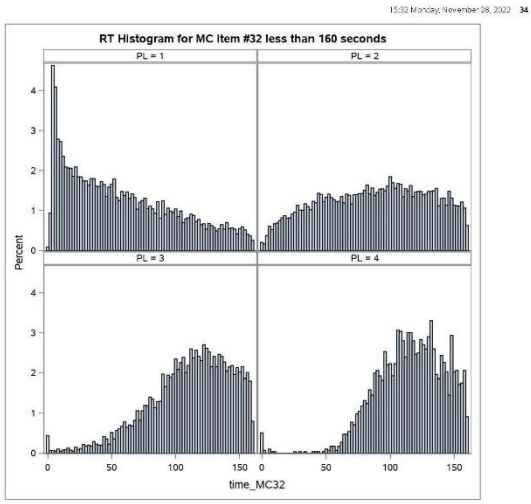

15:32 Monday, November 28, 2022 30
RT Histogram for MC Item #28 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
50
100
150
time_MC28

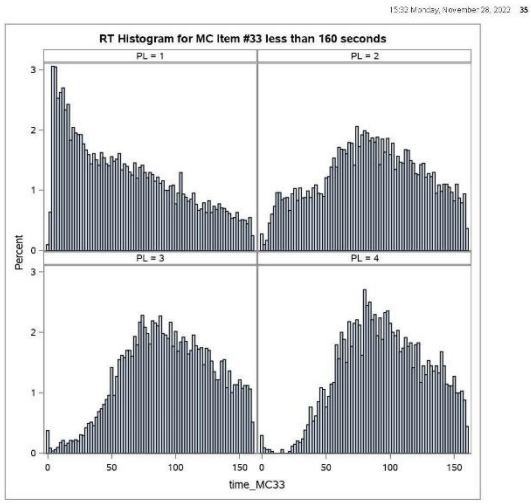

15:32 Monday, November 28, 2022 31
RT Histogram for MC Item #29 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC29

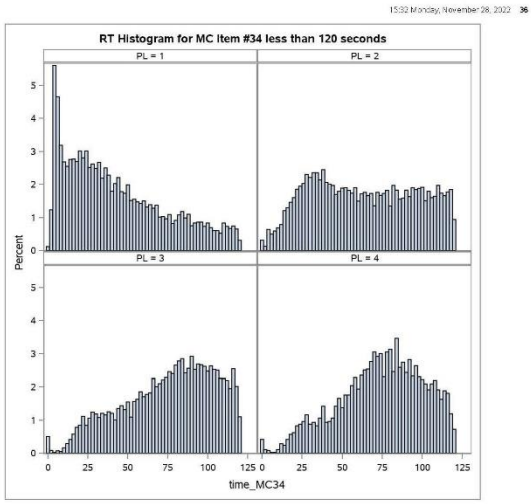

15:32 Monday, November 28, 2022 32
RT Histogram for MC item #30 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC30

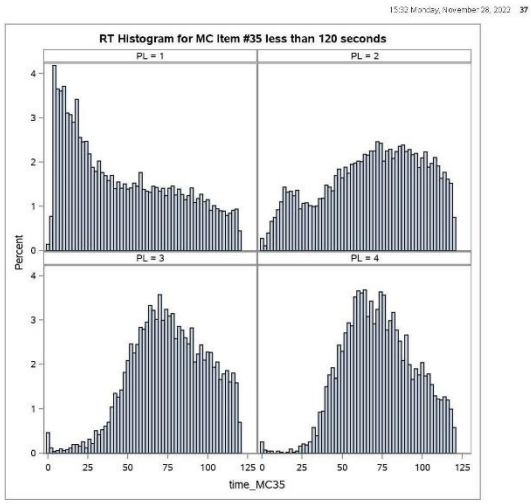
15:32 Monday, November 28, 2022 33

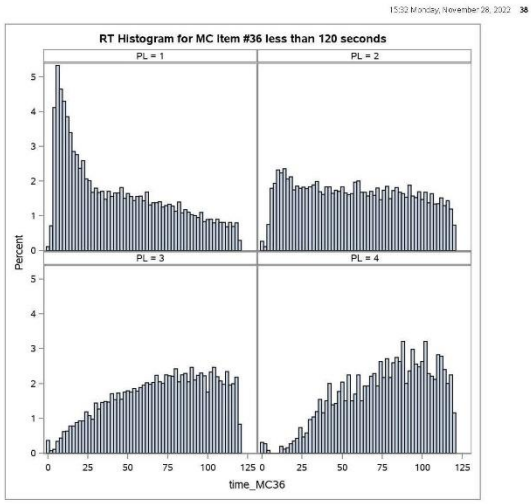


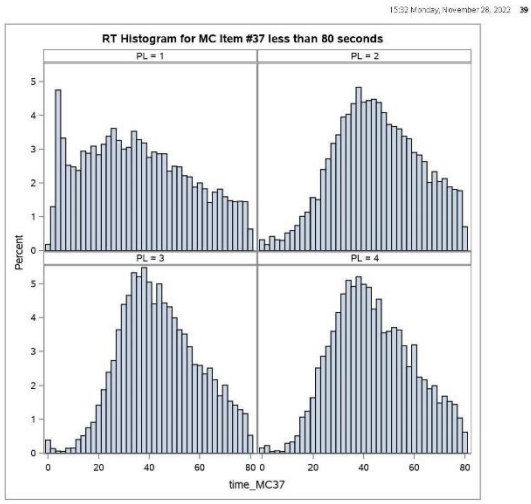

15:32 Monday, November 28, 2022 34
RT Histogram for MC Item #32 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC32

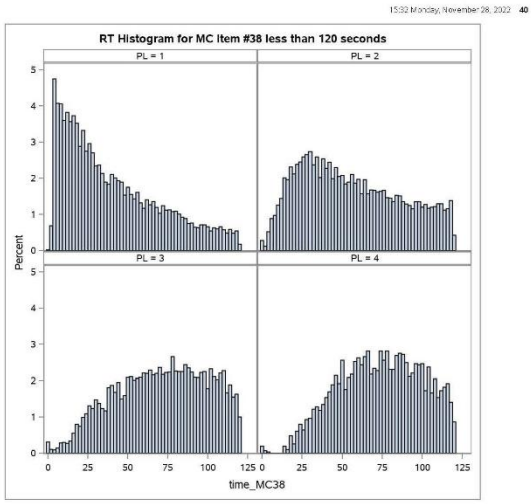

15:32 Monday, November 28, 2022 35
RT Histogram for MC Item #33 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
50
100
150
time_MC33

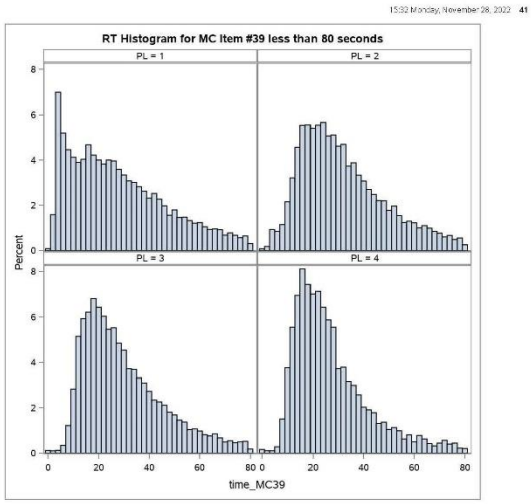

15:32 Monday, November 28, 2022 36
RT Histogram for MC Item #34 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC34

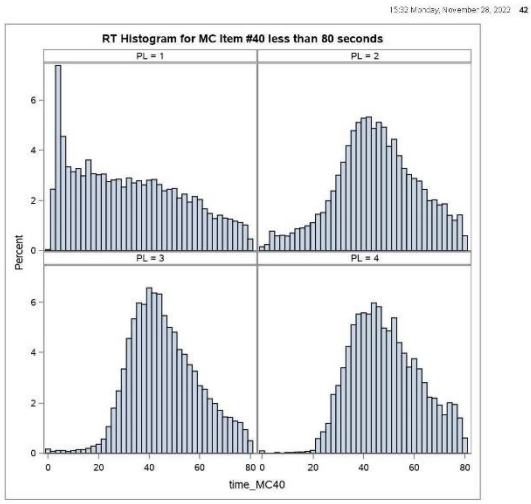

15:32 Monday, November 28, 2022 37
RT Histogram for MC Item #35 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC35

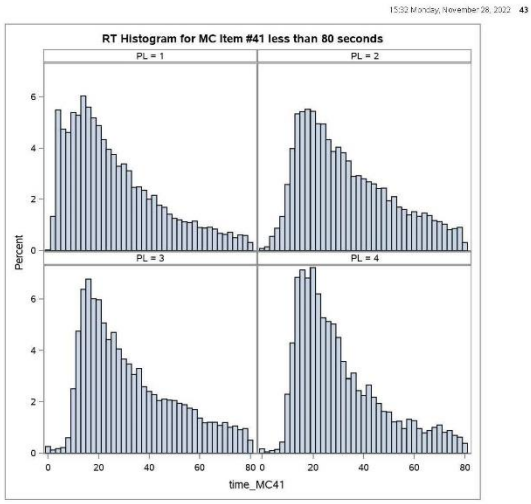

15:32 Monday, November 28, 2022 38
RT Histogram for MC Item #36 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC36

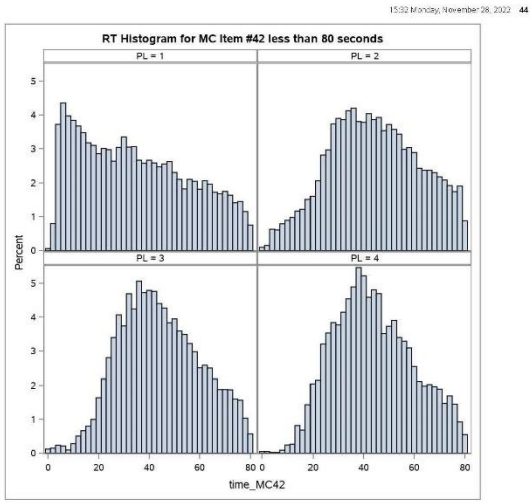

15:32 Monday, November 28, 2022 39
RT Histogram for MC Item #37 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC37

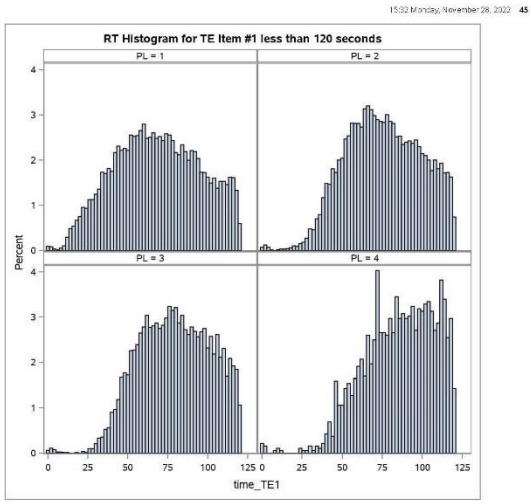

15:32 Monday, November 28, 2022 40
RT Histogram for MC Item #38 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC38

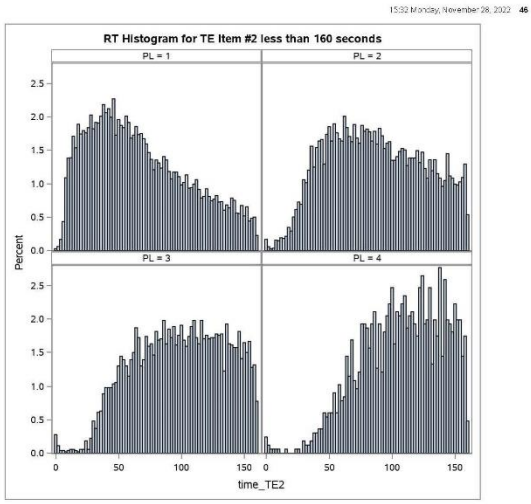

15:32 Monday, November 28, 2022 41
RT Histogram for MC Item #39 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC39

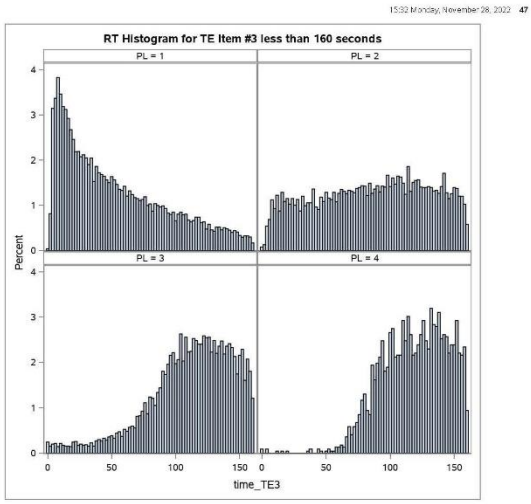

15:32 Monday, November 28, 2022 42
RT Histogram for MC item #40 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC40

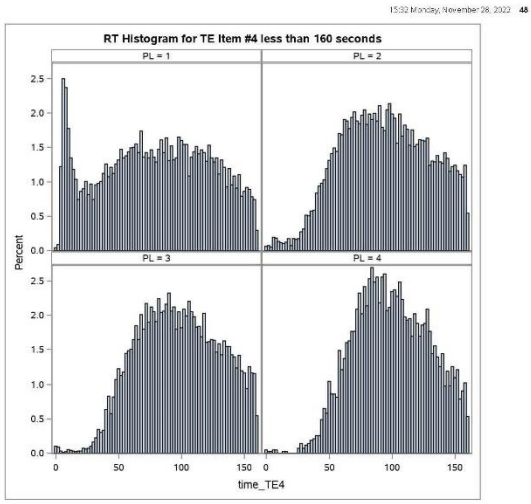

15:32 Monday, November 28, 2022 43
RT Histogram for MC item #41 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
0
20
40
60
80
time_MC41

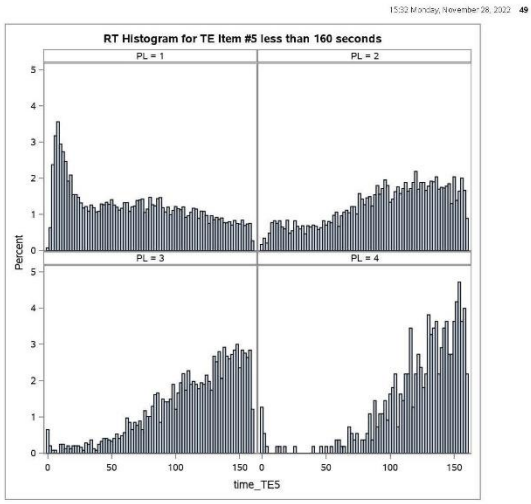

15:32 Monday, November 28, 2022 44
RT Histogram for MC item #42 less than 80 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC42

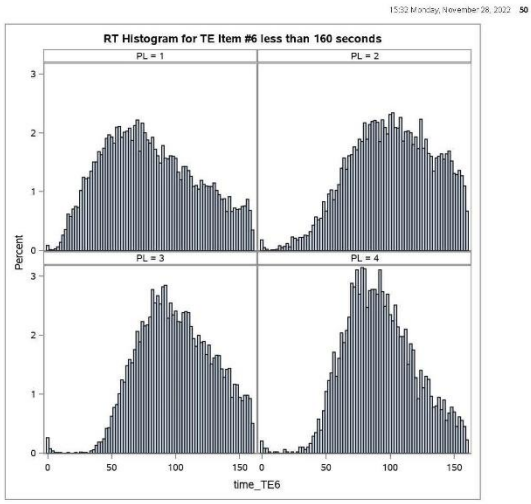

15:32 Monday, November 28, 2022 45
RT Histogram for TE Item #1 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE1

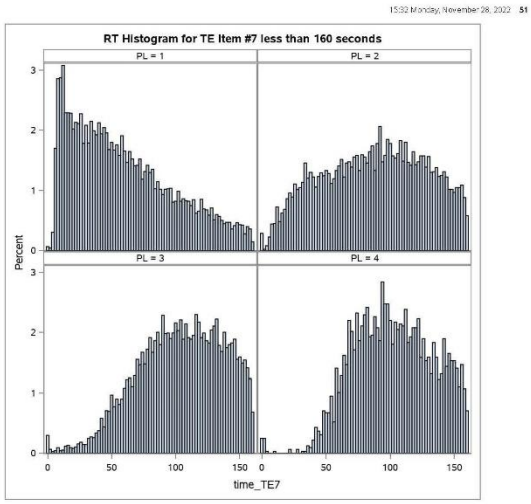

15:32 Monday, November 28, 2022 46
RT Histogram for TE Item #2 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE2


15:32 Monday, November 28, 2022 47
RT Histogram for TE Item #3 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE3


15:32 Monday, November 28, 2022 48
RT Histogram for TE Item #4 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE4


15:32 Monday, November 28, 2022 49
RT Histogram for TE Item #5 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE5


15:32 Monday, November 28, 2022 50
RT Histogram for TE Item #6 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE6


15:32 Monday, November 28, 2022 51
RT Histogram for TE Item #7 less than 160 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE7

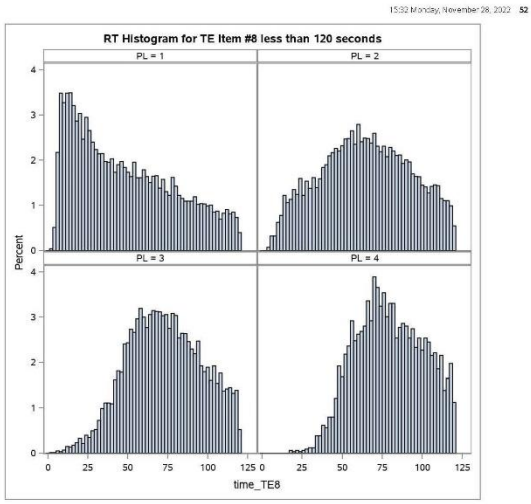
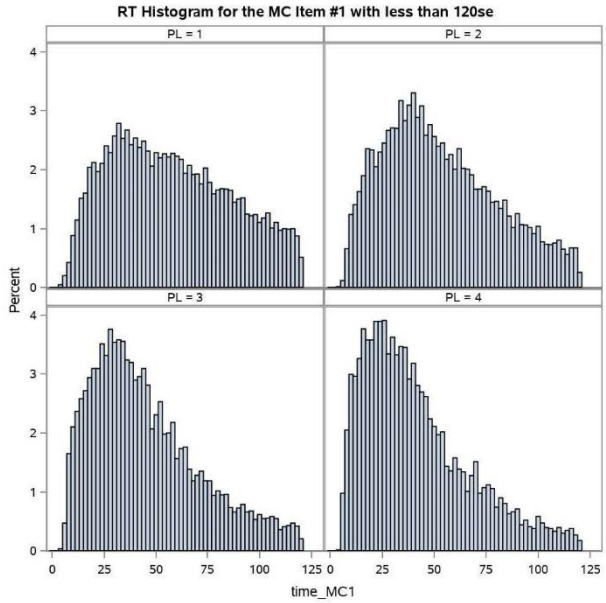
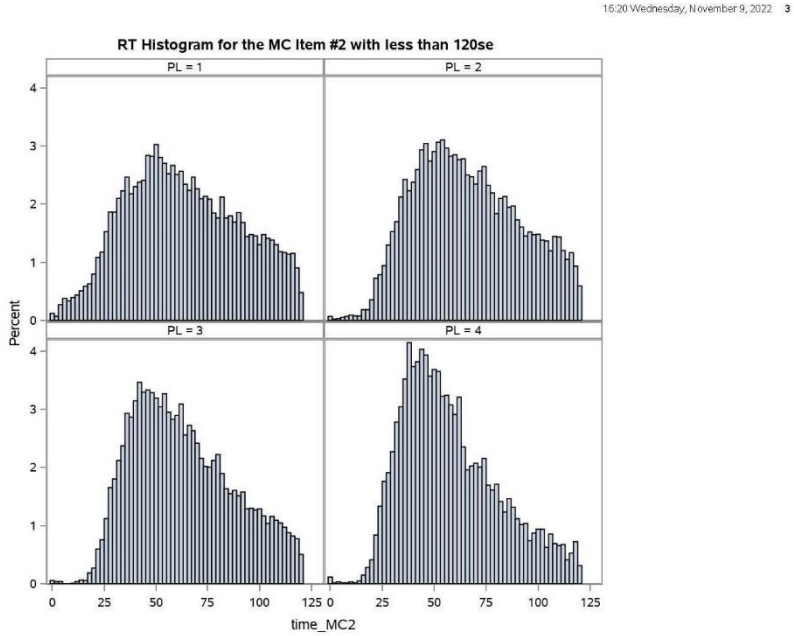

15:32 Monday, November 28, 2022 52
RT Histogram for TE Item #8 less than 120 seconds
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE8

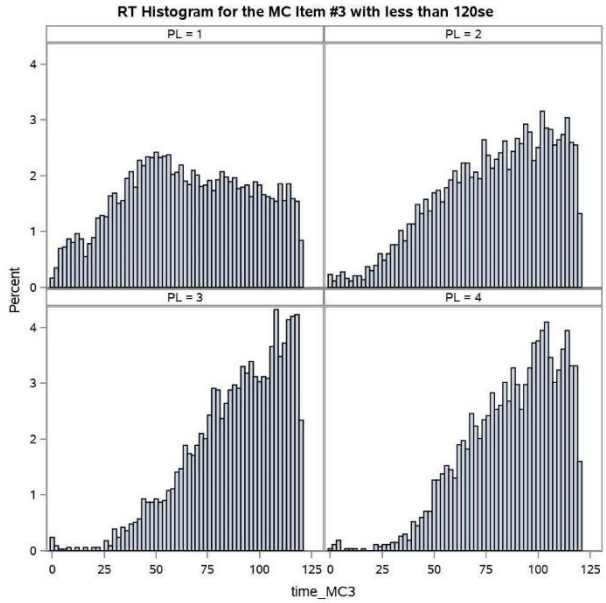
Figure 2: Histograms of Testing Time by Item and Performance Level for Mathematic Grade 5 Form A

16:20 Wednesday, November 9, 2022 2

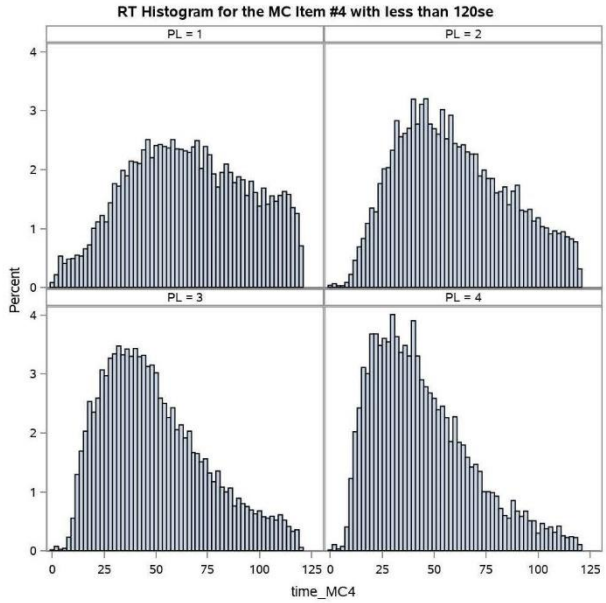



16:20 Wednesday, November 9, 2022 3
RT Histogram for the MC Item #2 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC2

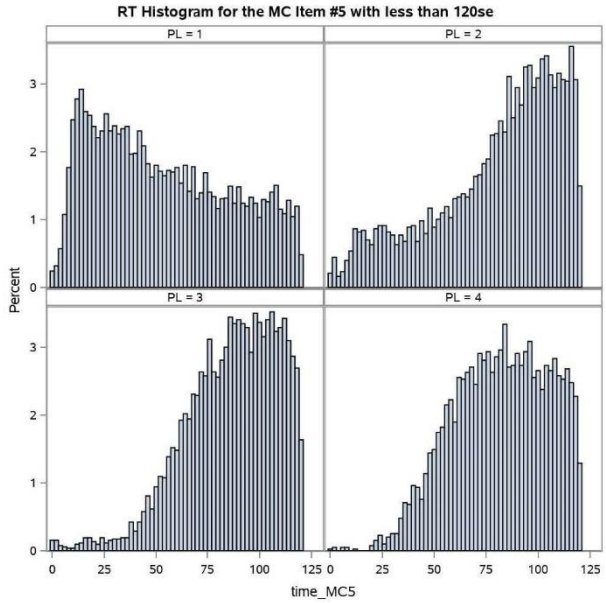
16:20 Wednesday, November 9, 2022 4

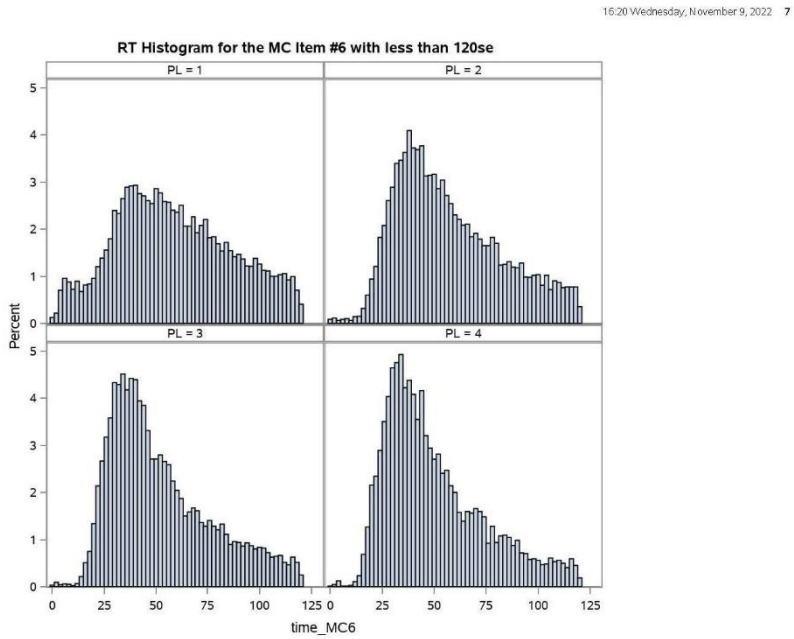


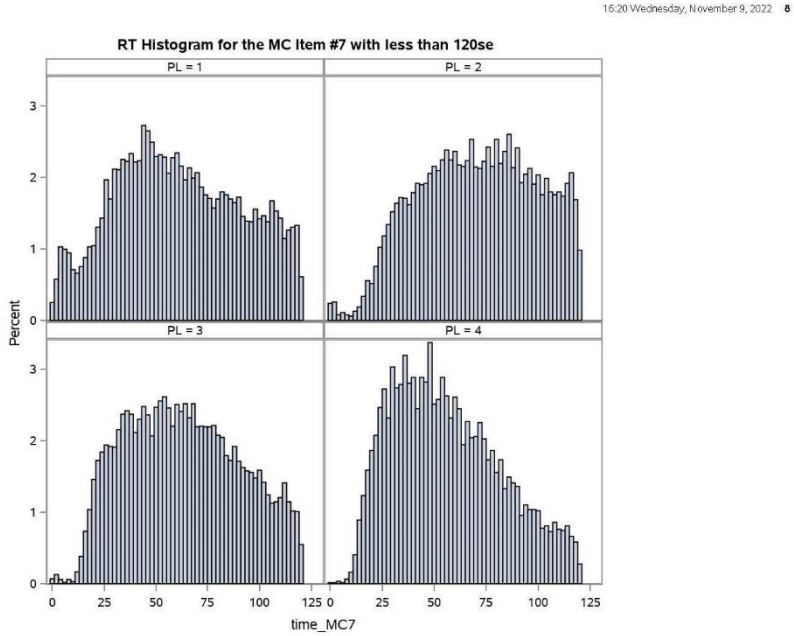
16:20 Wednesday, November 9, 2022 5



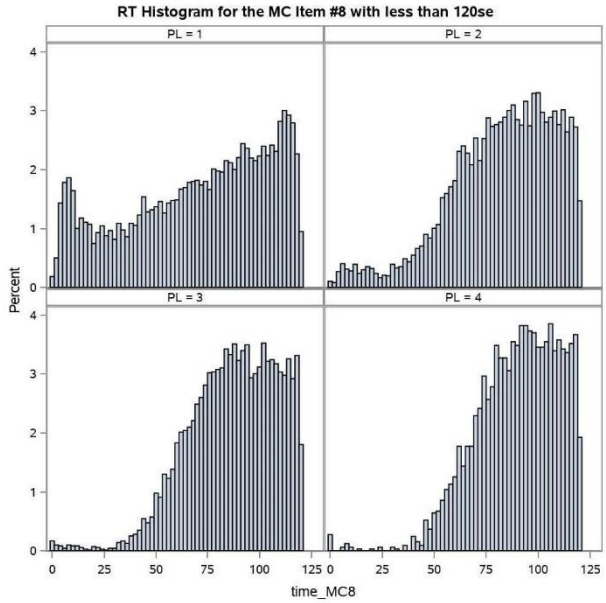
16:20 Wednesday, November 9, 2022 6

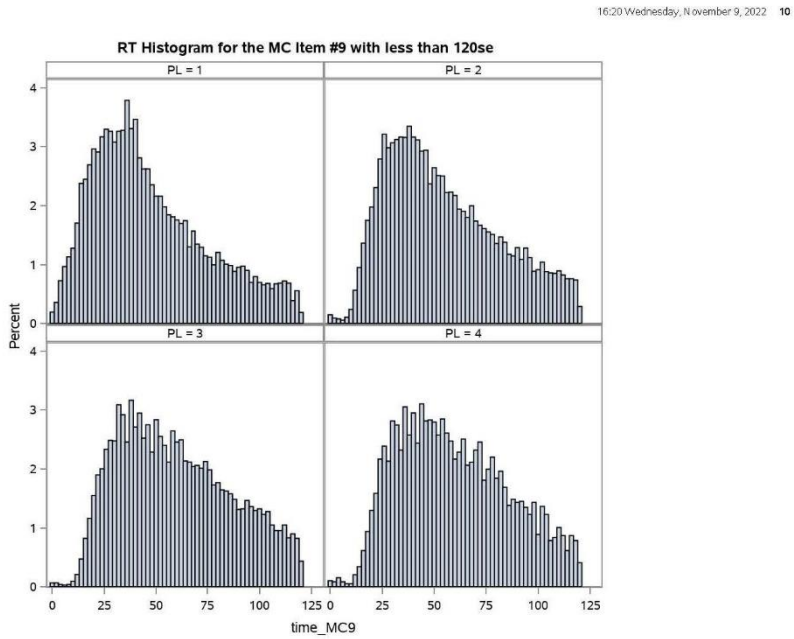


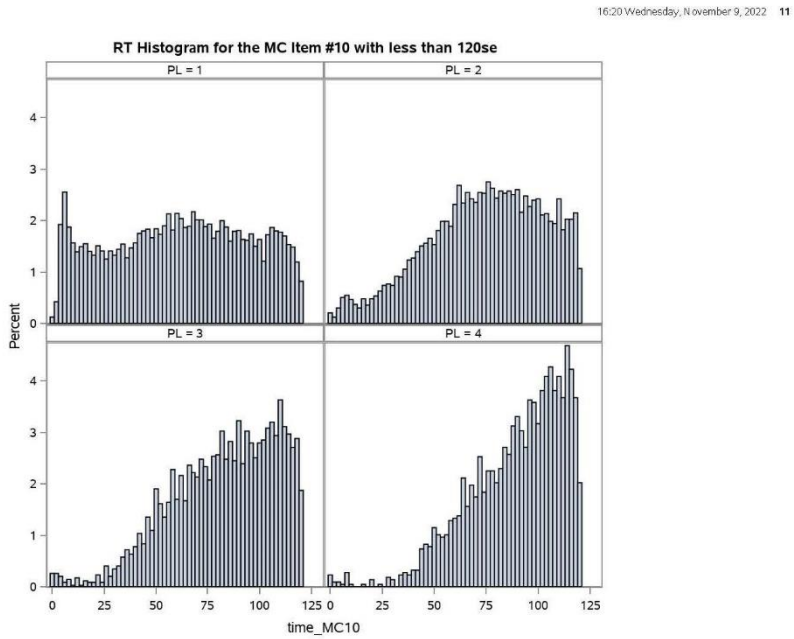

16:20 Wednesday, November 9, 2022 7
RT Histogram for the MC Item #6 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC6

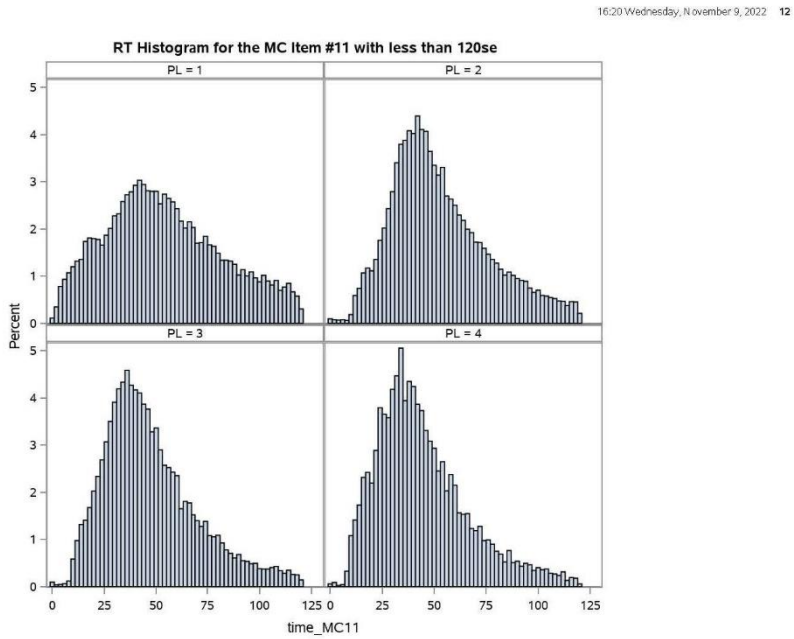

16:20 Wednesday, November 9, 2022 8
RT Histogram for the MC Item #7 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC7

16:20 Wednesday, November 9, 2022 9

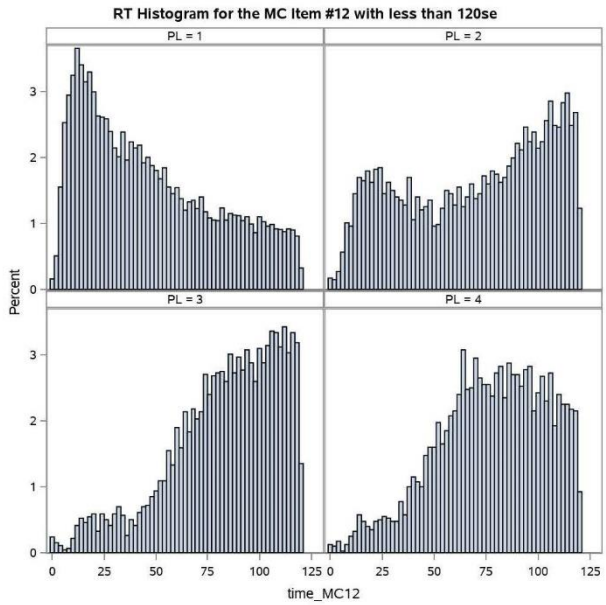


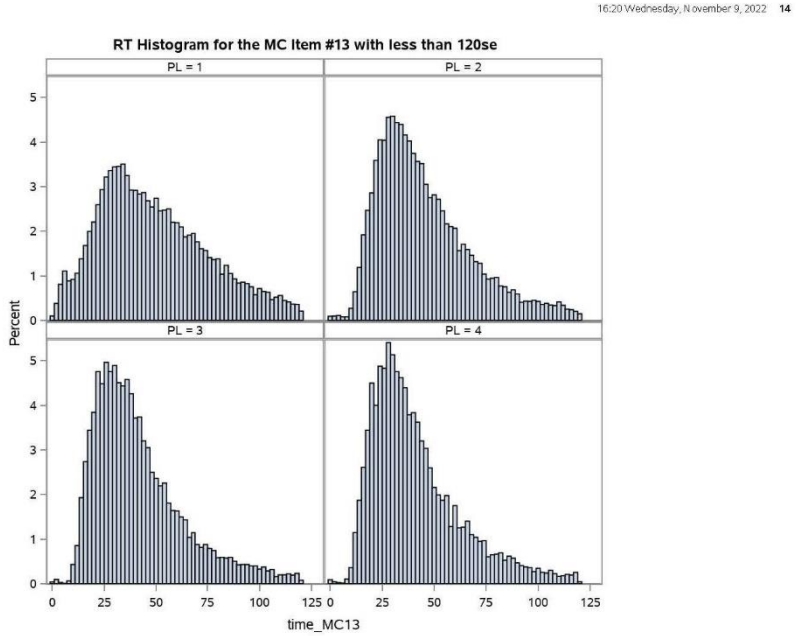

16:20 Wednesday, November 9, 2022 10
RT Histogram for the MC Item #9 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC9


16:20 Wednesday, November 9, 2022 11
RT Histogram for the MC Item #10 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC10

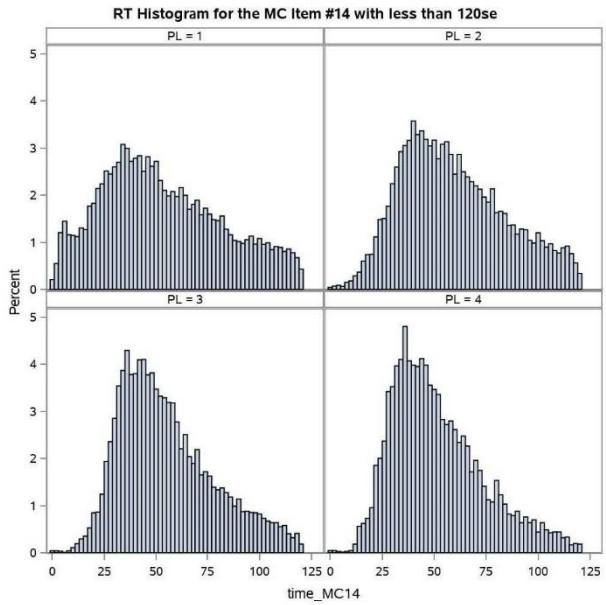

16:20 Wednesday, November 9, 2022 12
RT Histogram for the MC Item #11 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC11

16:20 Wednesday, November 9, 2022 13

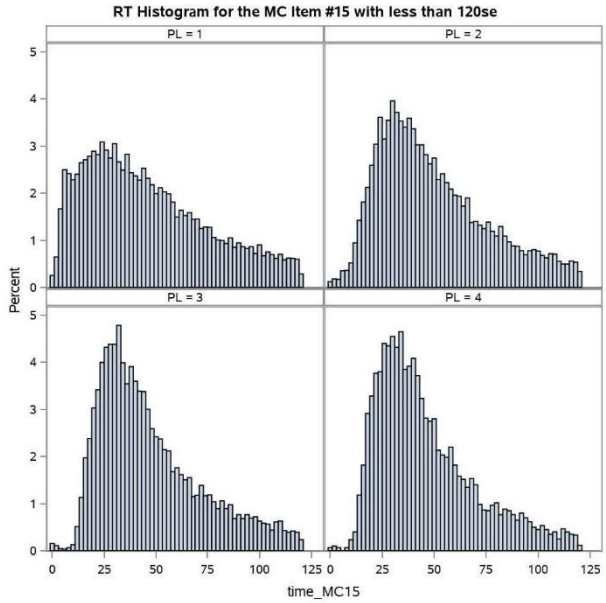



16:20 Wednesday, November 9, 2022 14
RT Histogram for the MC Item #13 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC13

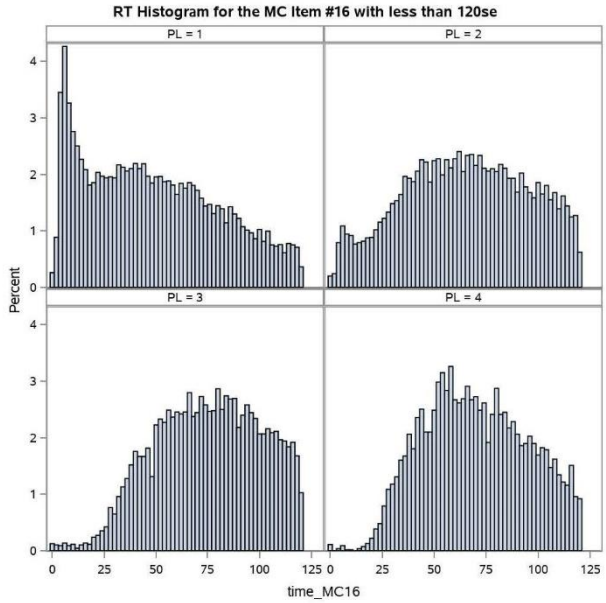
16:20 Wednesday, November 9, 2022 15

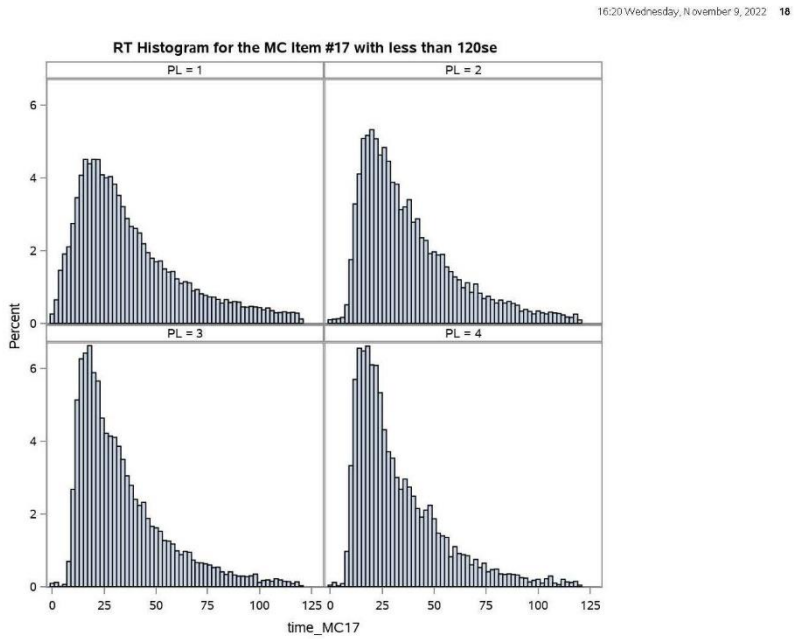


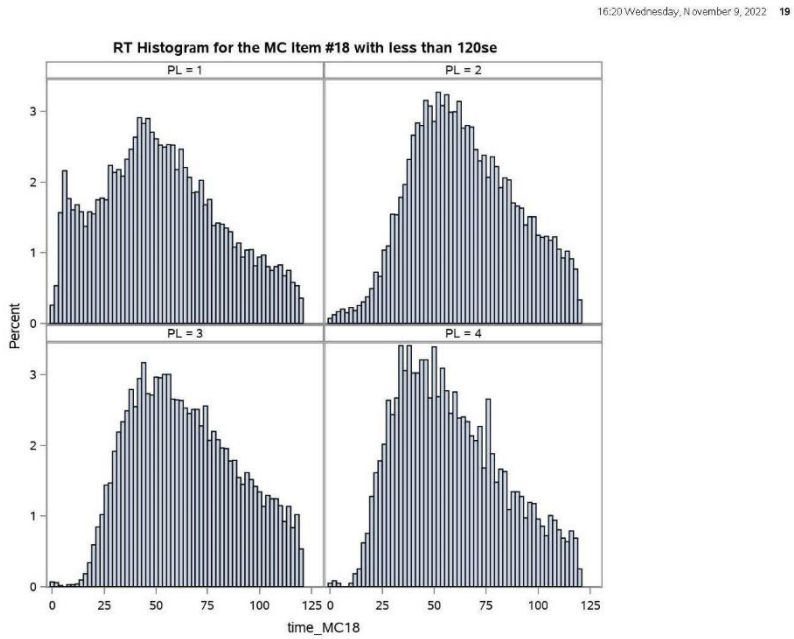
16:20 Wednesday, November 9, 2022 16



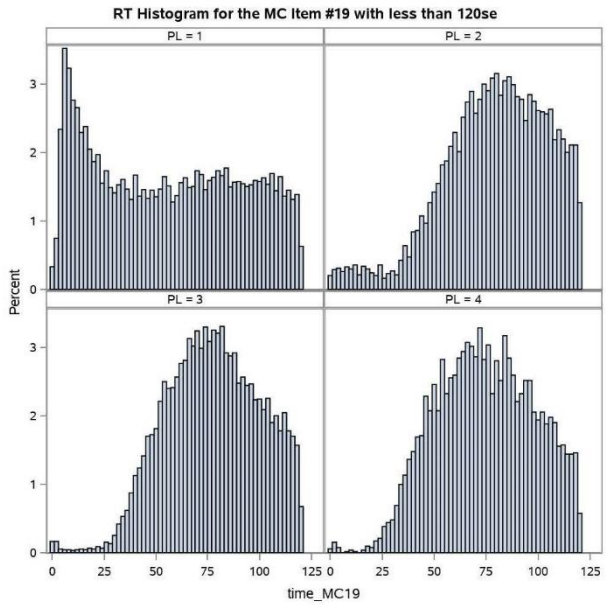
16:20 Wednesday, November 9, 2022 17

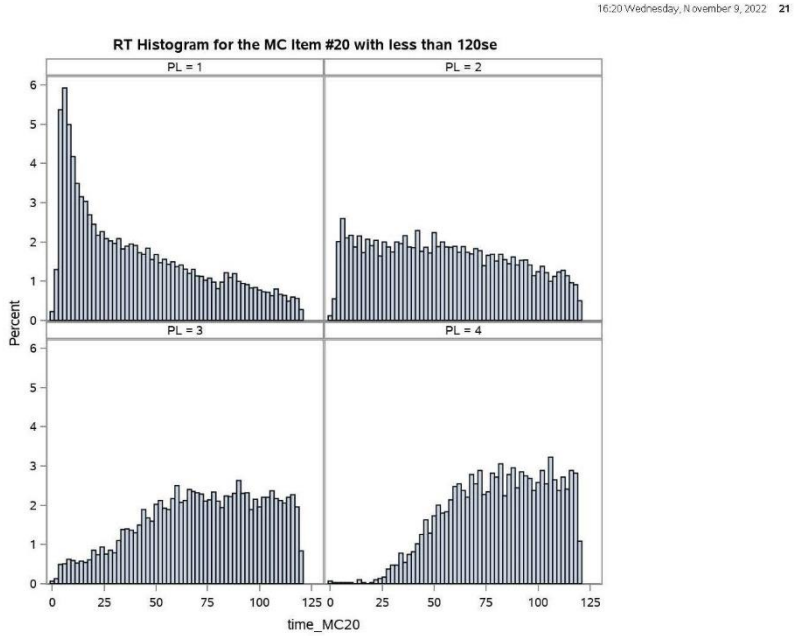



16:20 Wednesday, November 9, 2022 18
RT Histogram for the MC Item #17 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
0
25
50
75
100
125
time_MC17

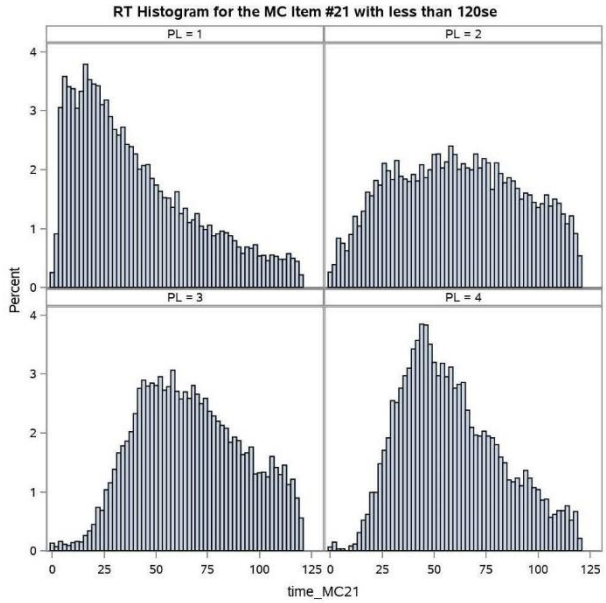

16:20 Wednesday, November 9, 2022 19
RT Histogram for the MC Item #18 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC18

16:20 Wednesday, November 9, 2022 20

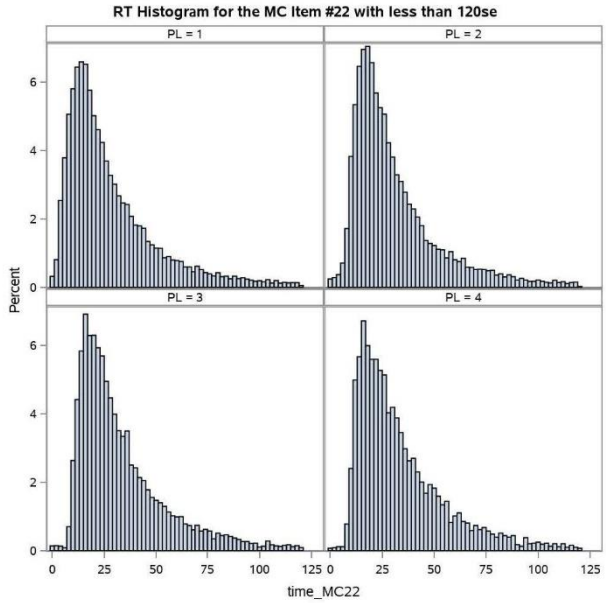


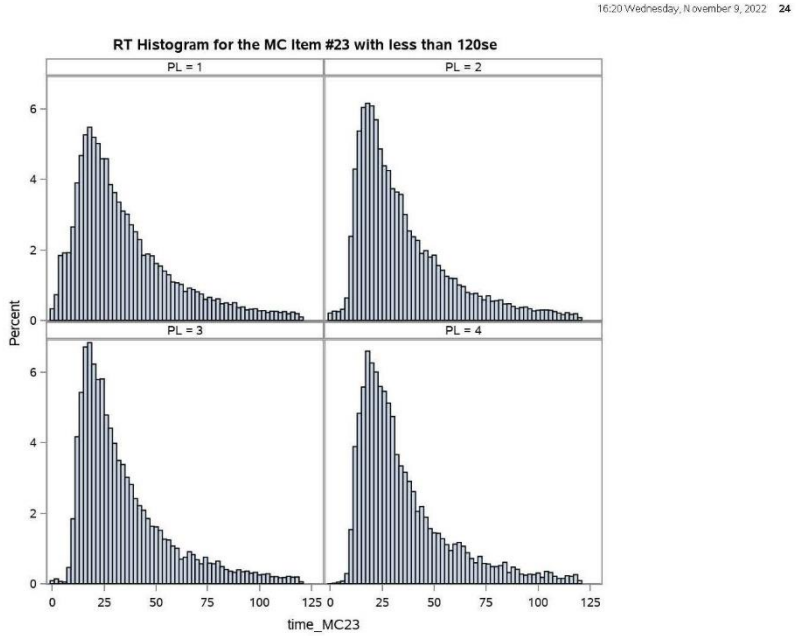

16:20 Wednesday, November 9, 2022 21
RT Histogram for the MC Item #20 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC20

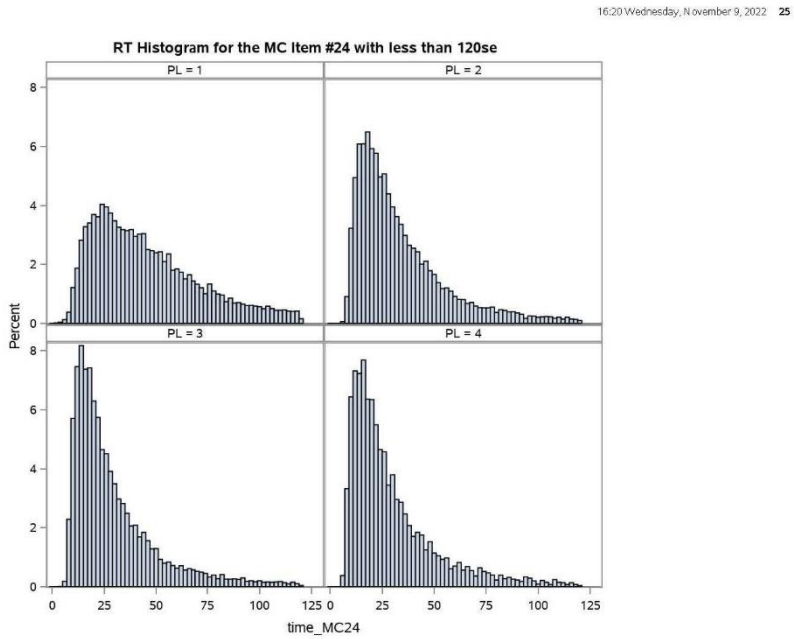
16:20 Wednesday, November 9, 2022 22



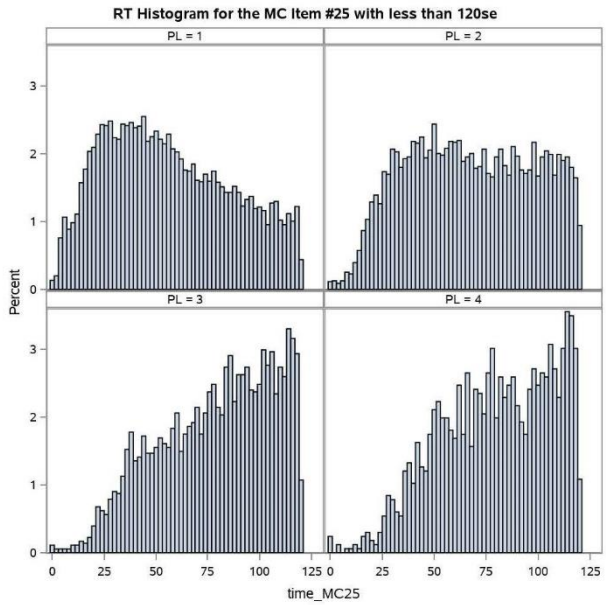
16:20 Wednesday, November 9, 2022 23



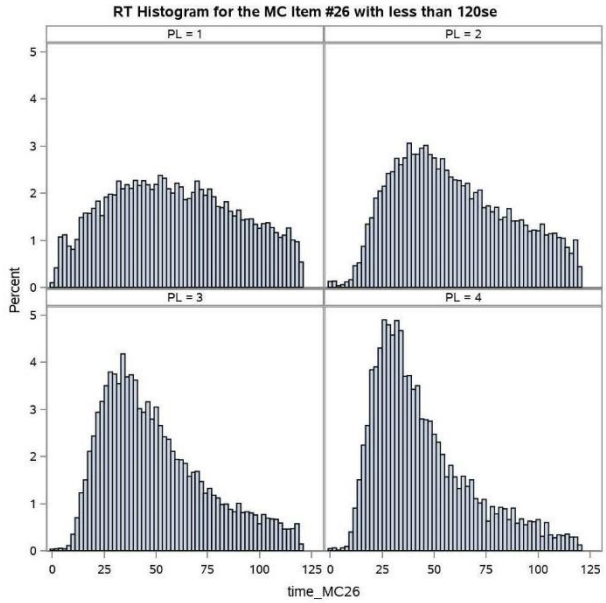

16:20 Wednesday, November 9, 2022 24
RT Histogram for the MC Item #23 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
0
25
50
75
100
125
time_MC23

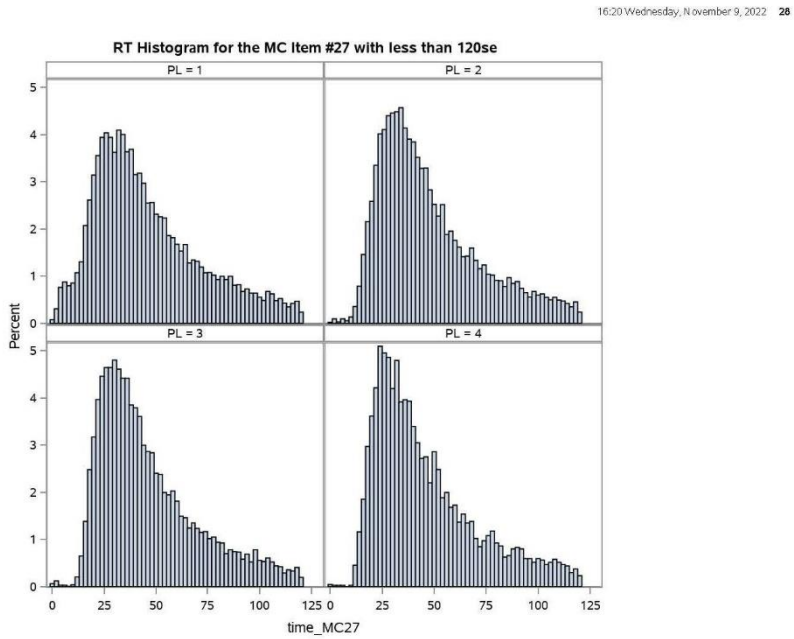

16:20 Wednesday, November 9, 2022 25
RT Histogram for the MC Item #24 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
8
0
25
50
75
100
125
time_MC24

16:20 Wednesday, November 9, 2022 26

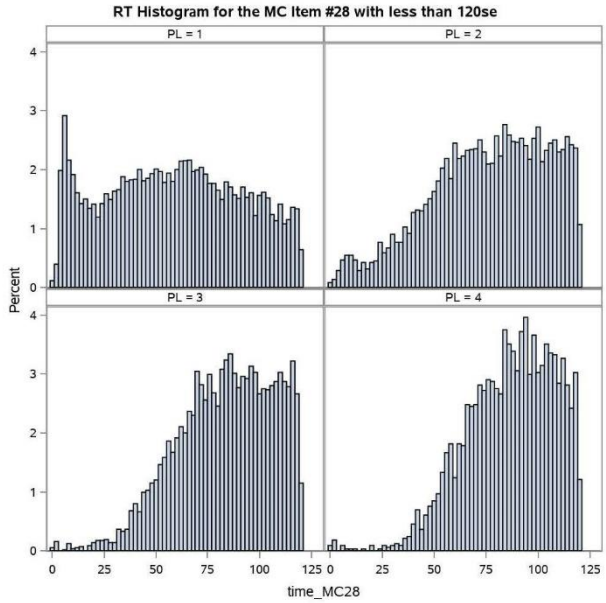


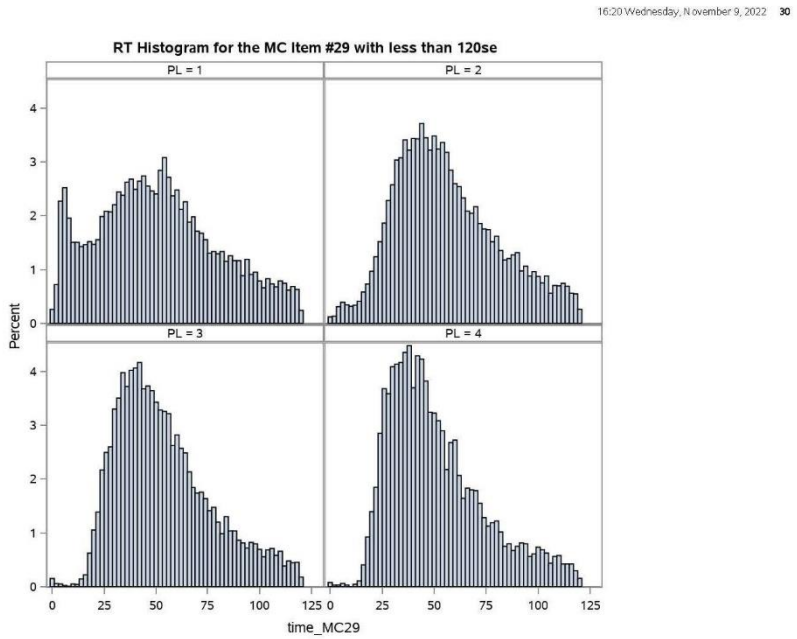
16:20 Wednesday, November 9, 2022 27



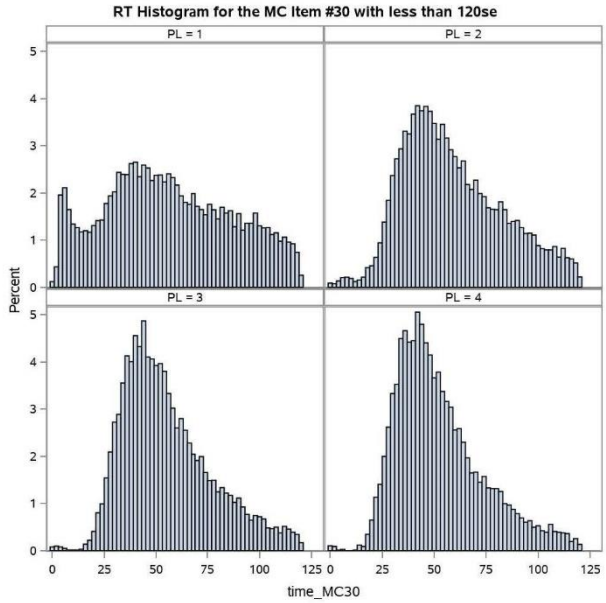

16:20 Wednesday, November 9, 2022 28
RT Histogram for the MC Item #27 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC27

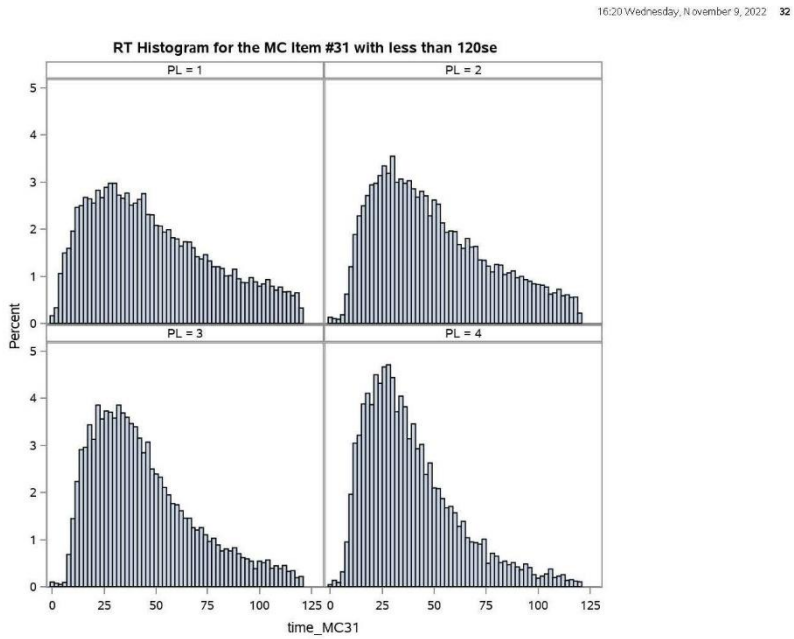
16:20 Wednesday, November 9, 2022 29

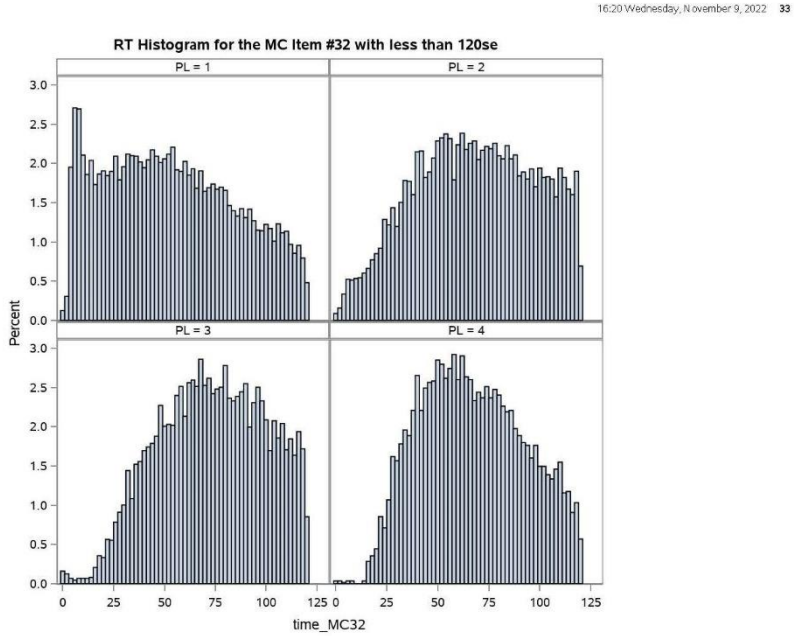


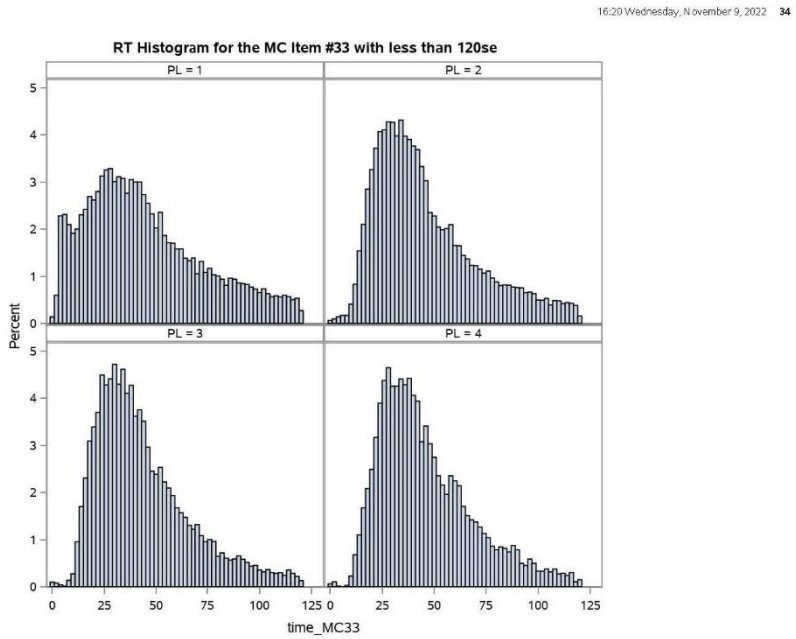

16:20 Wednesday, November 9, 2022 30
RT Histogram for the MC Item #29 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC29

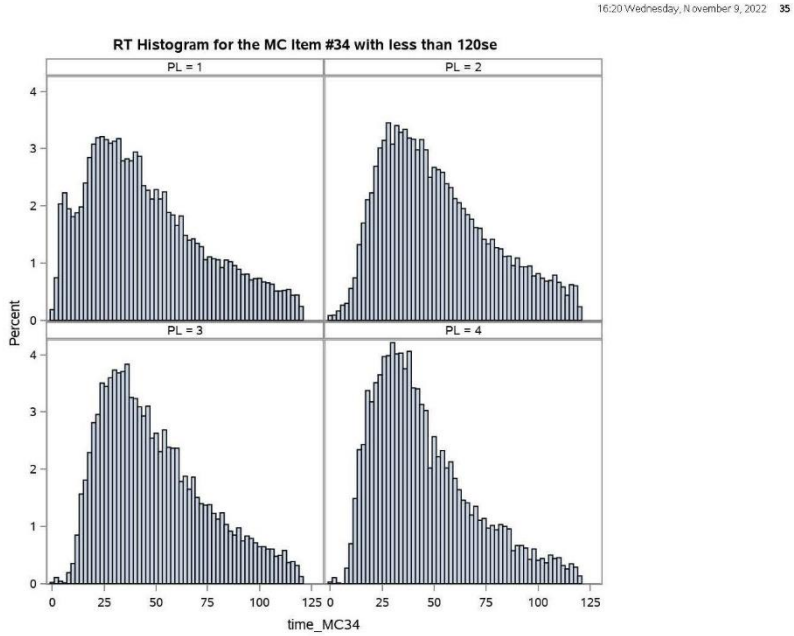
16:20 Wednesday, November 9, 2022 31

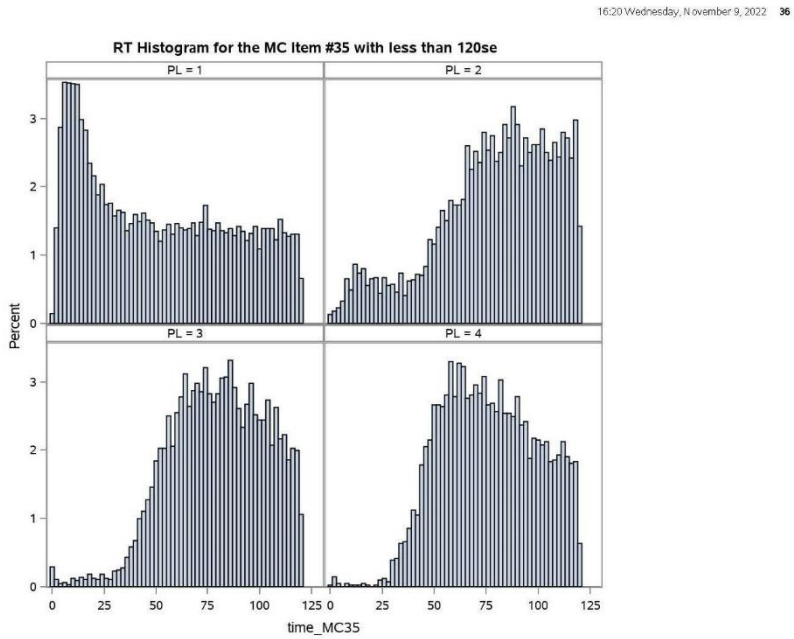


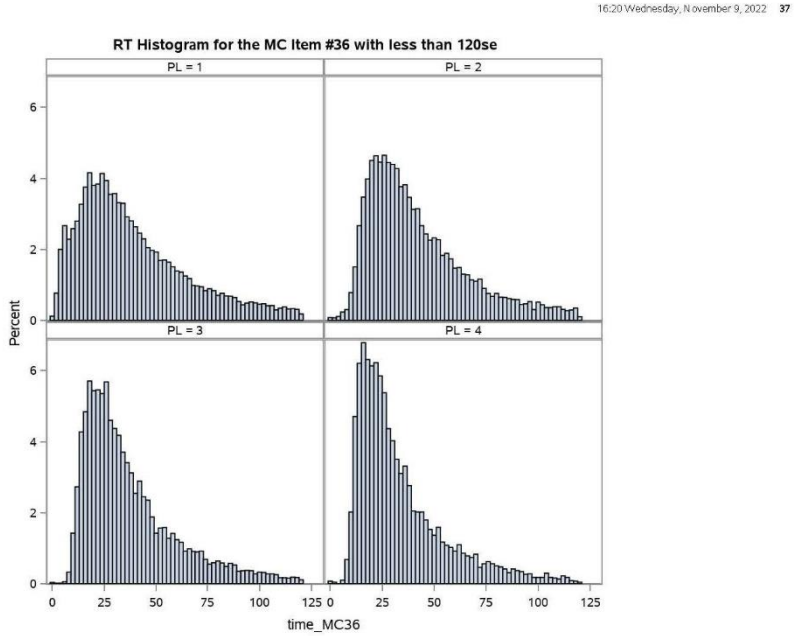

16:20 Wednesday, November 9, 2022 32
RT Histogram for the MC Item #31 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC31

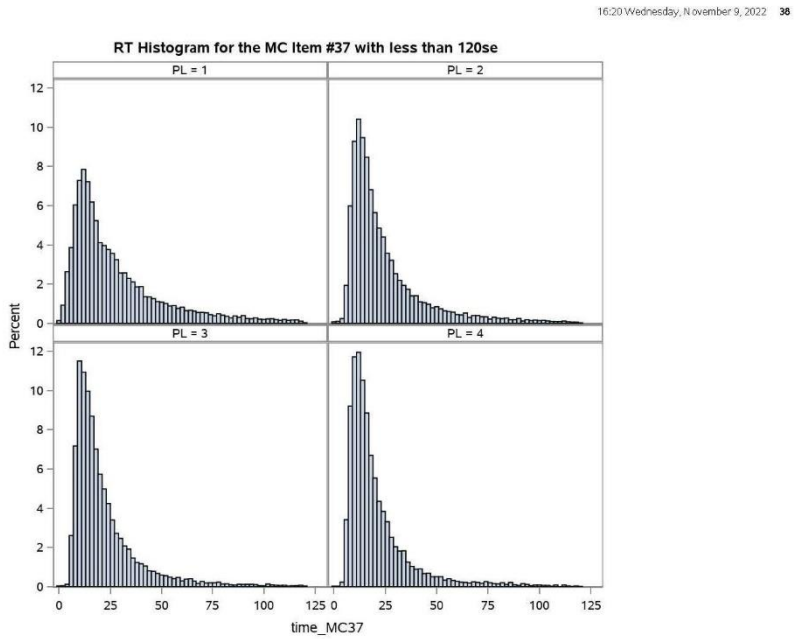

16:20 Wednesday, November 9, 2022 33
RT Histogram for the MC Item #32 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC32


16:20 Wednesday, November 9, 2022 34
RT Histogram for the MC Item #33 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC33

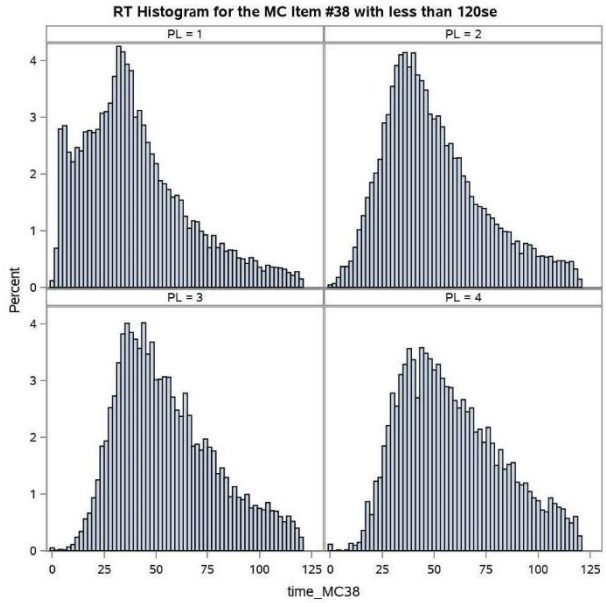

16:20 Wednesday, November 9, 2022 35
RT Histogram for the MC Item #34 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC34

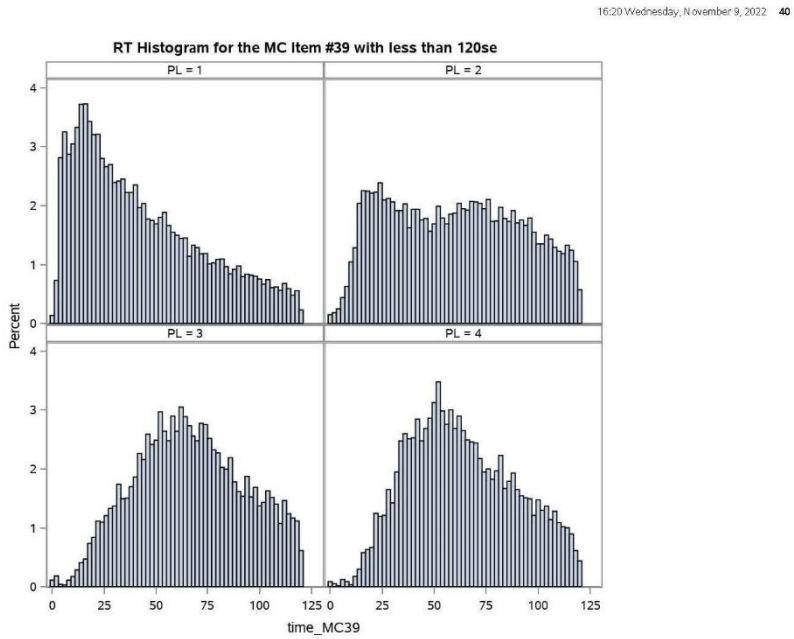

16:20 Wednesday, November 9, 2022 36
RT Histogram for the MC Item #35 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
25
50
75
100
125
time_MC35

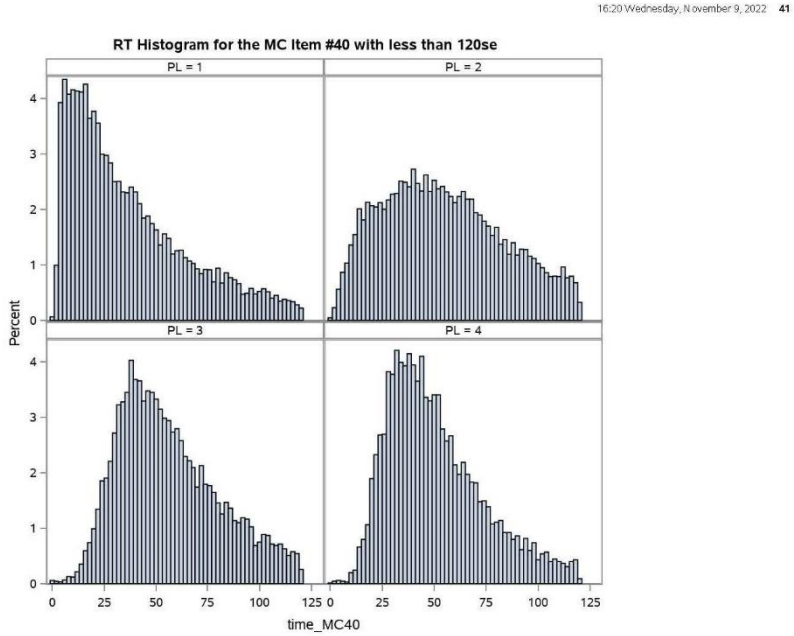

16:20 Wednesday, November 9, 2022 37
RT Histogram for the MC Item #36 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
2
4
6
0
25
50
75
100
125
time_MC36

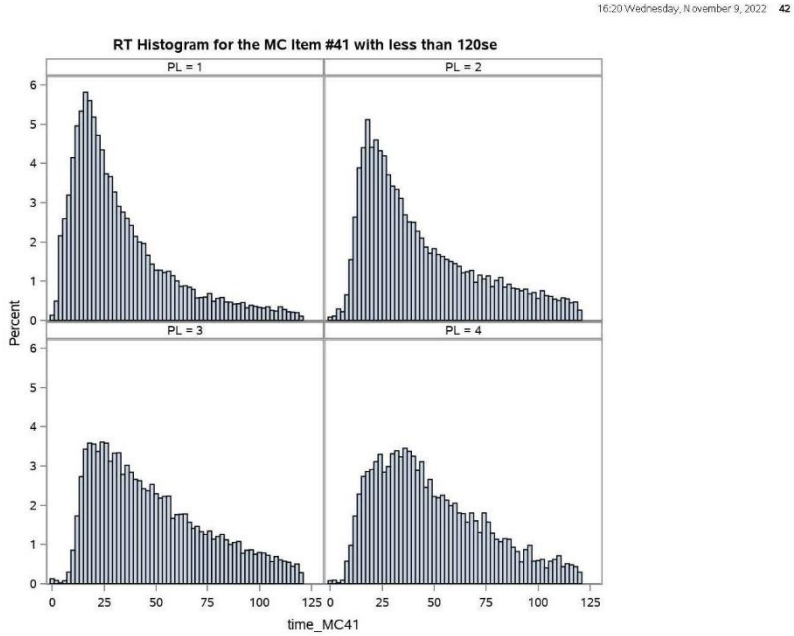

16:20 Wednesday, November 9, 2022 38
RT Histogram for the MC Item #37 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC37

16:20 Wednesday, November 9, 2022 39

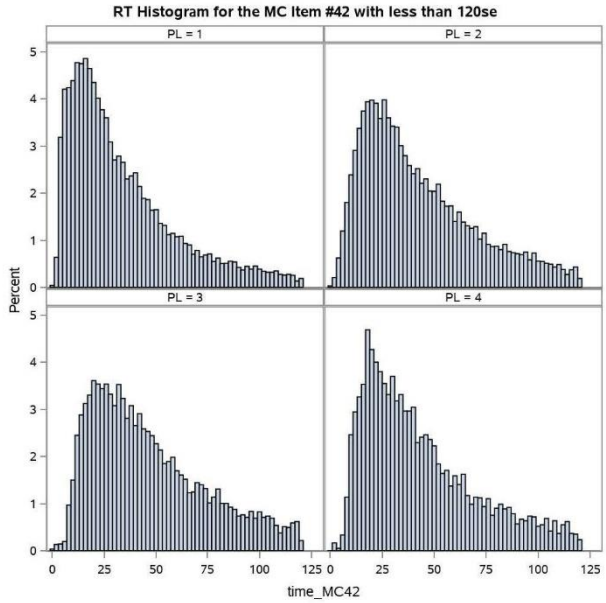



16:20 Wednesday, November 9, 2022 40
RT Histogram for the MC Item #39 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC39

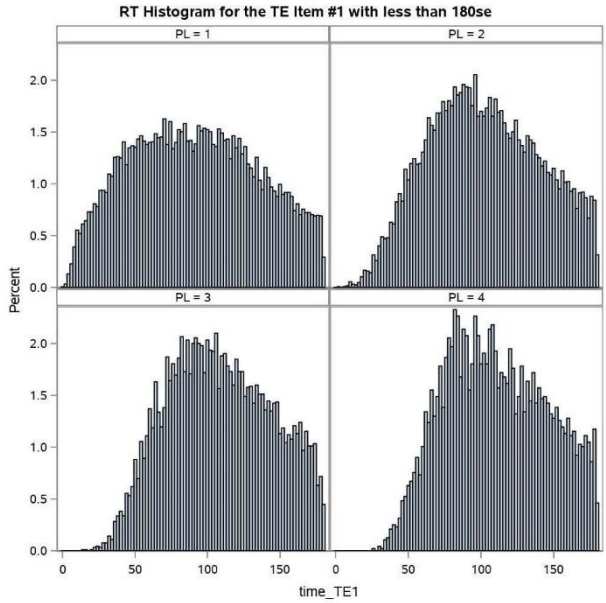

16:20 Wednesday, November 9, 2022 41
RT Histogram for the MC Item #40 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
4
0
25
50
75
100
125
time_MC40

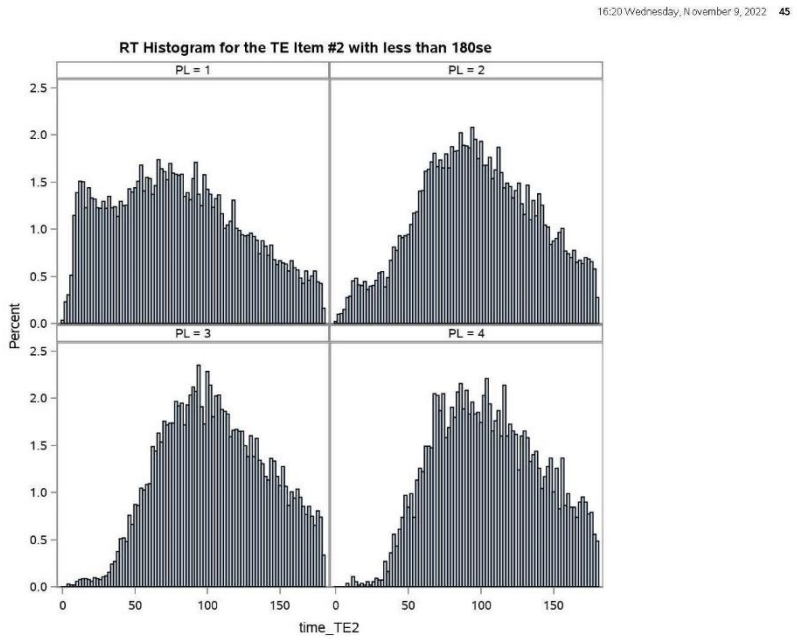

16:20 Wednesday, November 9, 2022 42
RT Histogram for the MC Item #41 with less than 120se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_MC41

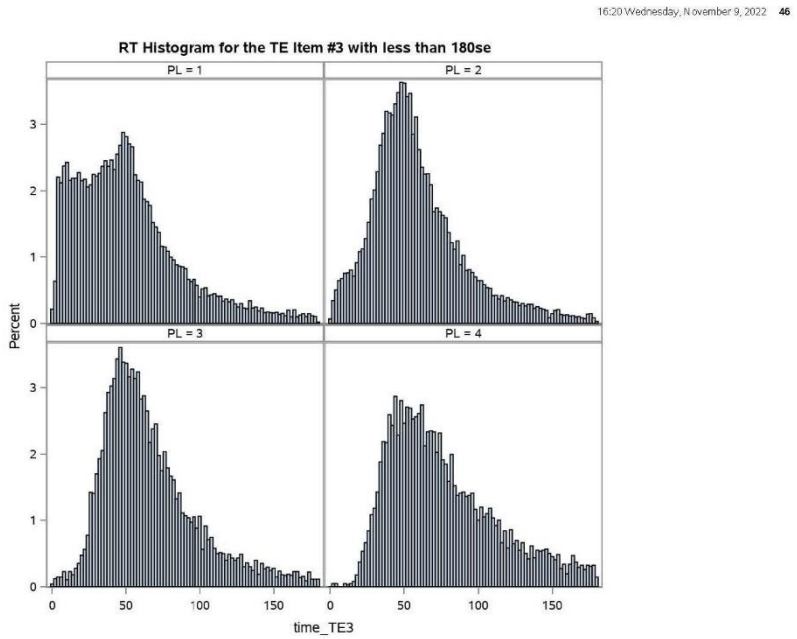
16:20 Wednesday, November 9, 2022 43



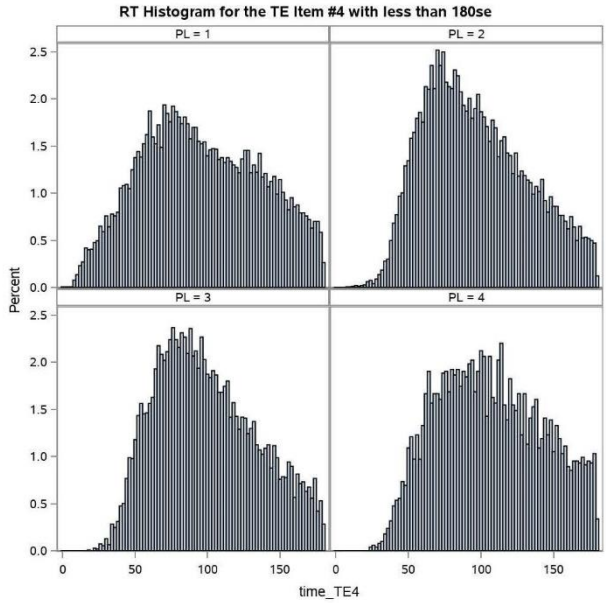
16:20 Wednesday, November 9, 2022 44

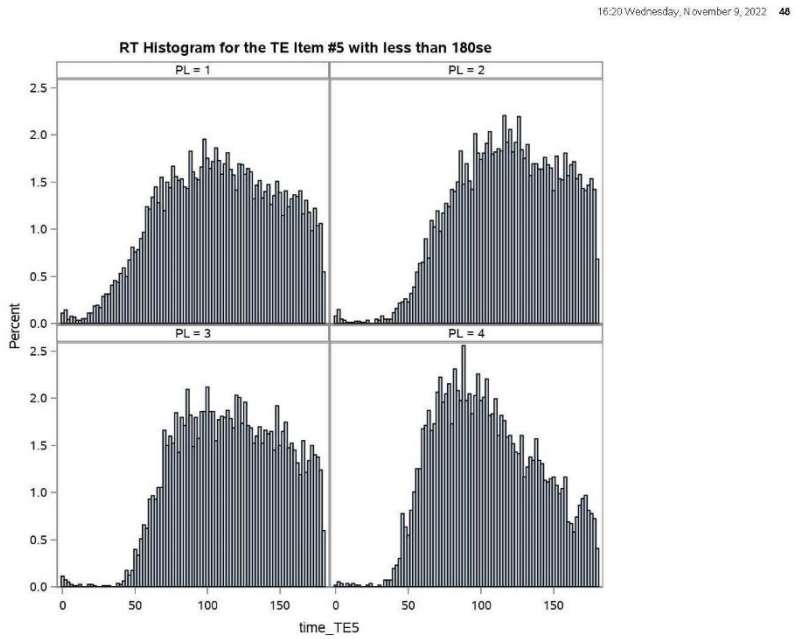



16:20 Wednesday, November 9, 2022 45
RT Histogram for the TE Item #2 with less than 180se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE2

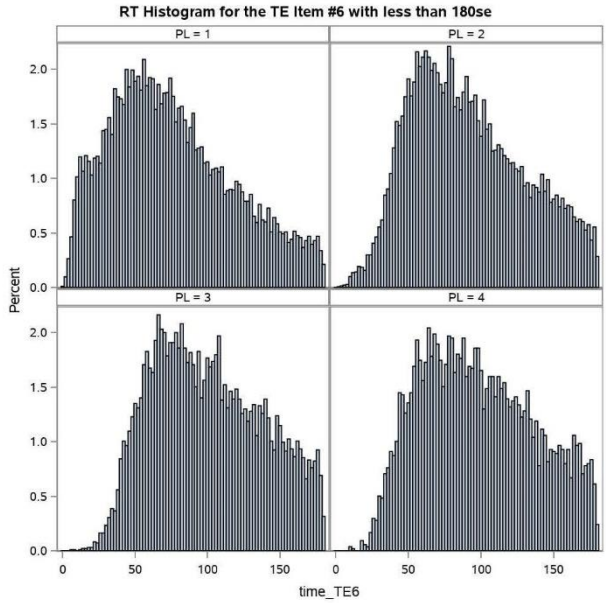

16:20 Wednesday, November 9, 2022 46
RT Histogram for the TE Item #3 with less than 180se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
0
1
2
3
0
50
100
150
time_TE3

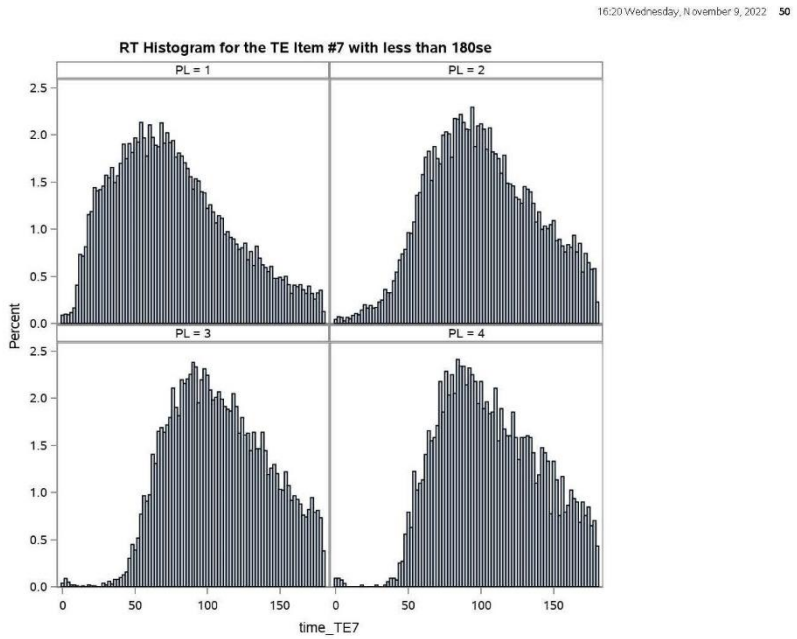
16:20 Wednesday, November 9, 2022 47

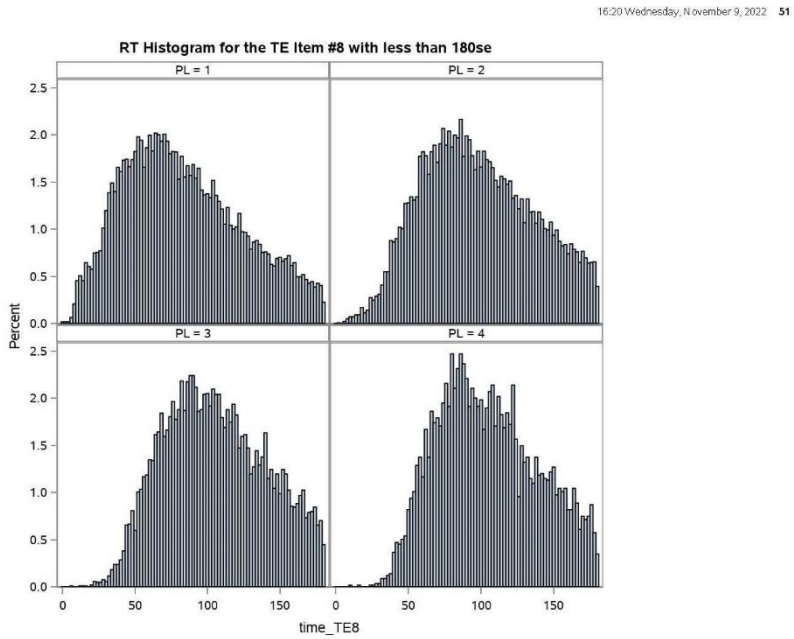



16:20 Wednesday, November 9, 2022 48
RT Histogram for the TE Item #5 with less than 180se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
2.5
2.0
1.5
1.0
0.5
0.0
0
50
100
150
time_TE5

16:20 Wednesday, November 9, 2022 49




16:20 Wednesday, November 9, 2022 50
RT Histogram for the TE Item #7 with less than 180se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE7


16:20 Wednesday, November 9, 2022 51
RT Histogram for the TE Item #8 with less than 180se
PL = 1
PL = 2
PL = 3
PL = 4
Percent
time_TE8