

# Item Analysis Report

Item Analysis Report for FIMS Japan Students

Processed 27 December 2021

## Introduction

The item analysis results in this report were generated in the open source statistical software program R (R Core Team, 2017). The objective of the analysis is to identify test items of poor quality, and to see if the difficulty of the test appears to target the ability level of the students who were tested. Statistical measures from both classical test theory (CTT) and item response theory (IRT) are included.

## The data

A total of 2051 students took this 14 item test. The CTT test reliability index, coefficient alpha, was computed to be 0.726.

## Analysis results

In the following table of item statistics, Item Mean is CTT item difficulty; pBis is CTT item discrimination; AlphaIfDeleted indicates what reliability (alpha) would be if the item were deleted from the test - if AlphaIfDeleted is greater than alpha (in this case 0.726), the item has not performed as might be desired, and its inclusion in the test may have served to lower reliability.

( Items with undesirable AlphaIfDeleted values: Item 7, Item 12 )

*Table 1: Summary of Item Statistics*

Item	Item Mean	pBis	AlphaIfDeleted	IRT difficulty
Q1	0.801	0.252	0.720	-1.124
Q2	0.883	0.359	0.711	-1.859
Q3	0.917	0.234	0.721	-2.275
Q4	0.719	0.359	0.708	-0.585
Q5	0.342	0.542	0.685	1.429
Q6	0.902	0.256	0.719	-2.071
Q7	0.353	0.202	0.728	1.371
Q8	0.373	0.286	0.718	1.255

Q9	0.413	0.445	0.697	1.039
Q10	0.652	0.375	0.706	-0.203
Q11	0.389	0.538	0.684	1.172
Q12	0.308	0.025	0.747	1.631
Q13	0.405	0.441	0.698	1.086
Q14	0.764	0.431	0.700	-0.867

## Item discrimination index

CTT item discrimination indexes for all items ranged from 0.02 to 0.54.

( Weak items with CTT discrimination lower than 0.25: Item 3, Item 7, Item 12 )

## Test targeting

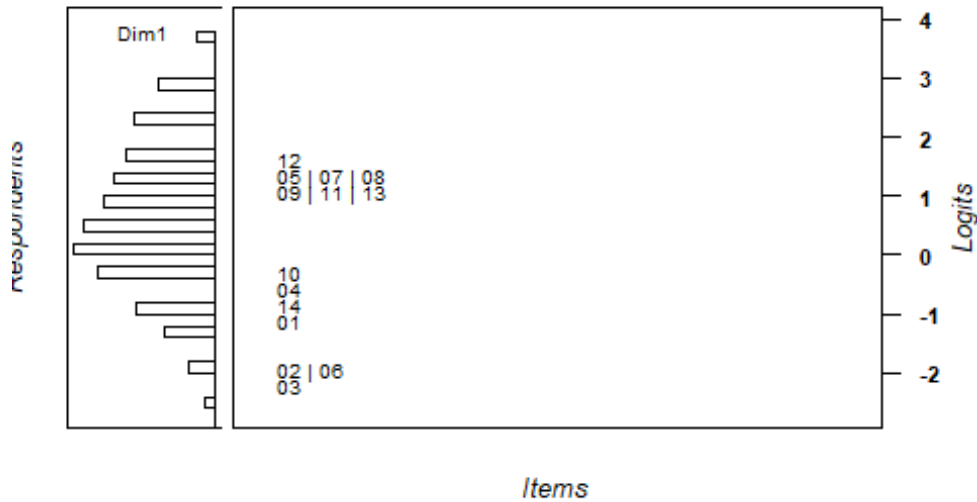
The mean IRT student ability score was 0.661; the mean IRT item difficulty was 0.

( The test was easy for these students. )

## Wright Map

A [Wright Map](#) displays the distribution of both observed student ability scores, and item difficulty values, over the logits scale.

## Wright Map



## Mean IRT ability scores by groups

The tables in this section give summary results for students getting an item wrong (Group 0), and for those getting it correct (Group 1). Mean ability levels are expected to be higher in Group 1 - if they are not, the item has probably not worked as desired.

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
1	Q1	0	409	0.2	-0.38	-0.40
1	Q1	1	1642	0.8	0.38	0.87

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
2	Q2	0	239	0.12	-0.46	-1.05
2	Q2	1	1812	0.88	0.46	0.84

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
3	Q3	0	171	0.08	-0.33	-0.85
3	Q3	1	1880	0.92	0.33	0.75

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
4	Q4	0	576	0.28	-0.49	-0.42
4	Q4	1	1475	0.72	0.49	1.02

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
5	Q5	0	1349	0.66	-0.65	0.00
5	Q5	1	702	0.34	0.65	1.81

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
6	Q6	0	202	0.1	-0.36	-0.81
6	Q6	1	1849	0.9	0.36	0.77

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
7	Q7	0	1328	0.65	-0.37	0.26
7	Q7	1	723	0.35	0.37	1.28

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
8	Q8	0	1285	0.63	-0.44	0.17
8	Q8	1	766	0.37	0.44	1.37

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
9	Q9	0	1203	0.59	-0.57	-0.02
9	Q9	1	848	0.41	0.57	1.52

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
10	Q10	0	713	0.35	-0.51	-0.31
10	Q10	1	1338	0.65	0.51	1.11

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
11	Q11	0	1254	0.61	-0.64	-0.06
11	Q11	1	797	0.39	0.64	1.69

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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
12	Q12	0	1420	0.69	-0.19	0.45

12	Q12	1	631	0.31	0.19	1.00
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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
13	Q13	0	1221	0.6	-0.57	0.00
13	Q13	1	830	0.4	0.57	1.54

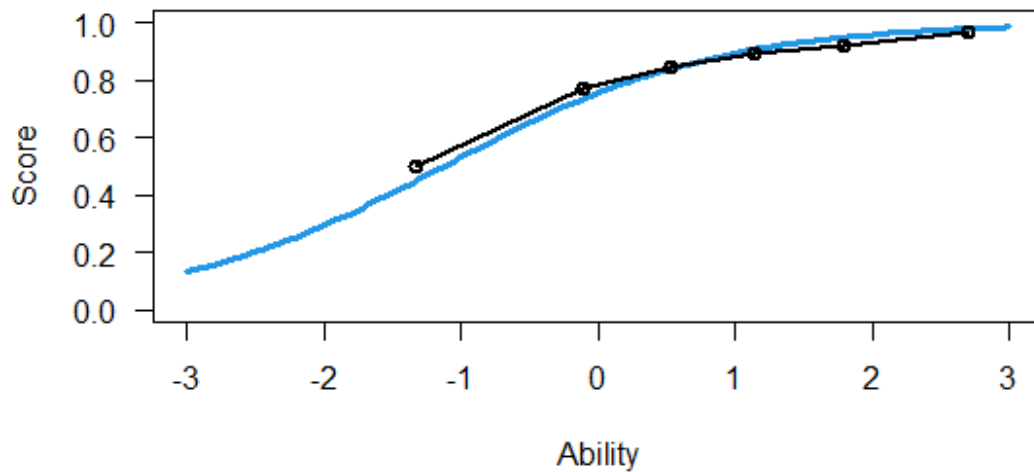
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Seq	Item	Group	Count	Percent	Pbs	MeanAbility
14	Q14	0	484	0.24	-0.54	-0.68
14	Q14	1	1567	0.76	0.54	1.02

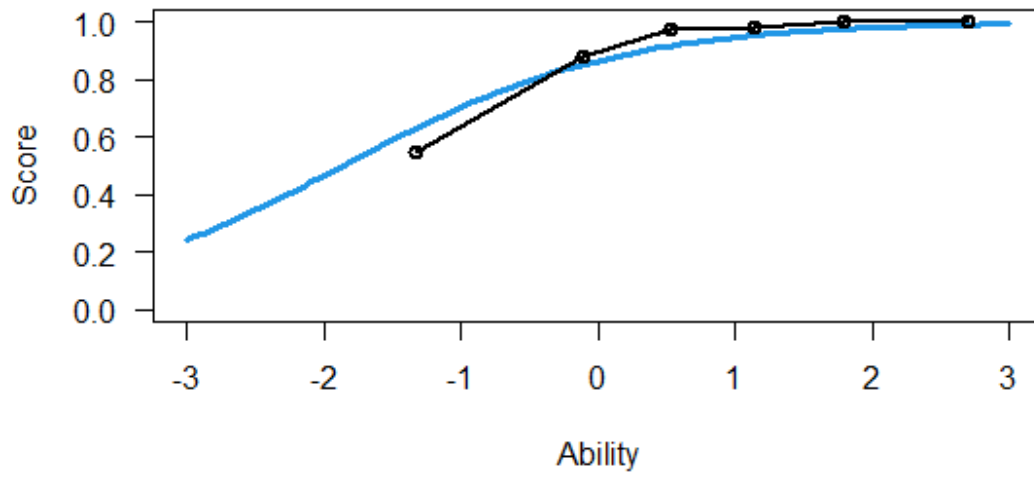
### Item characteristic curves

Item characteristic curves are shown below. Blue lines plot expected scores over the ability scale as would be predicted by the IRT model. Black lines connect the dots of actual average observed IRT scores at a few specific ability levels.

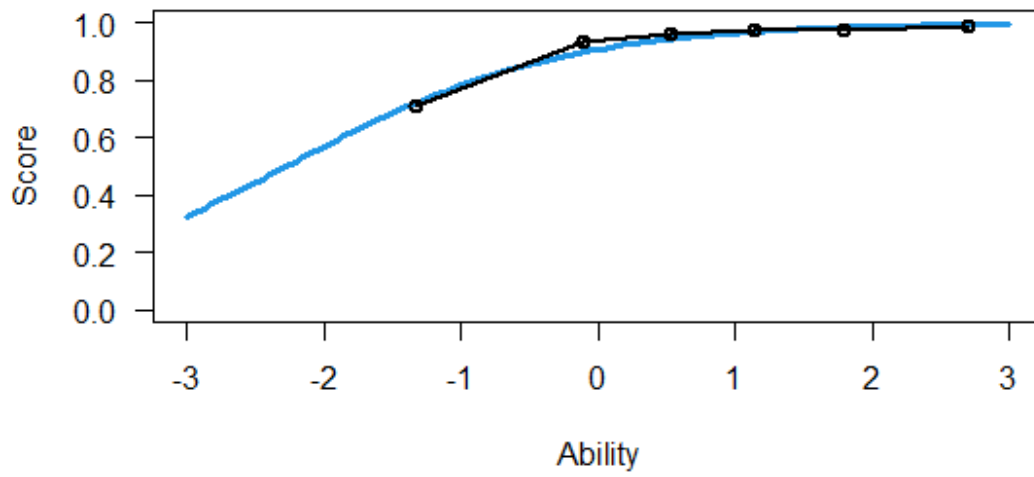
**Expected Scores Curve - Item Q1**



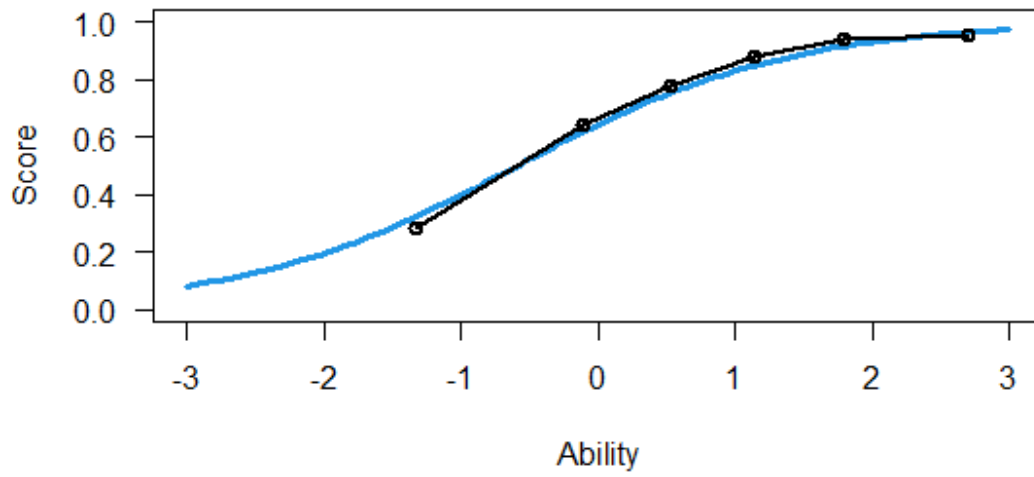
**Expected Scores Curve - Item Q2**



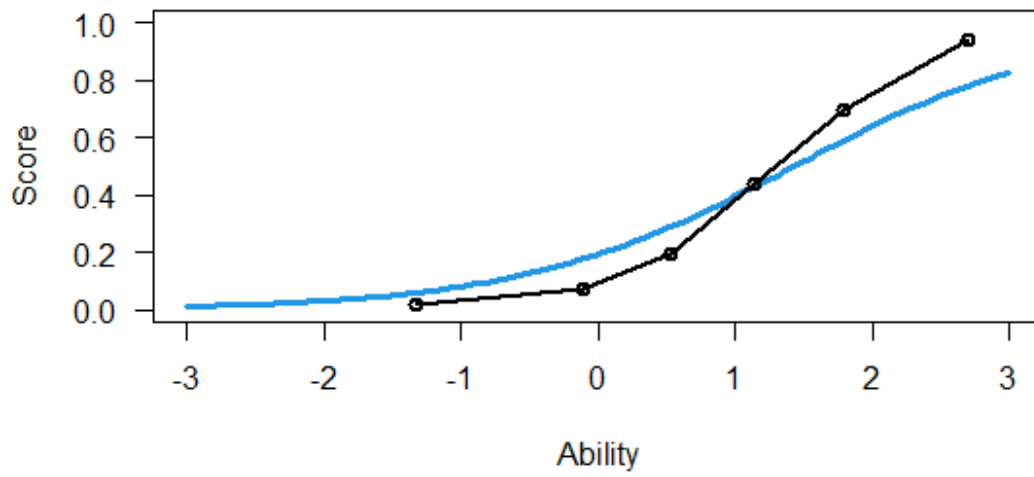
**Expected Scores Curve - Item Q3**



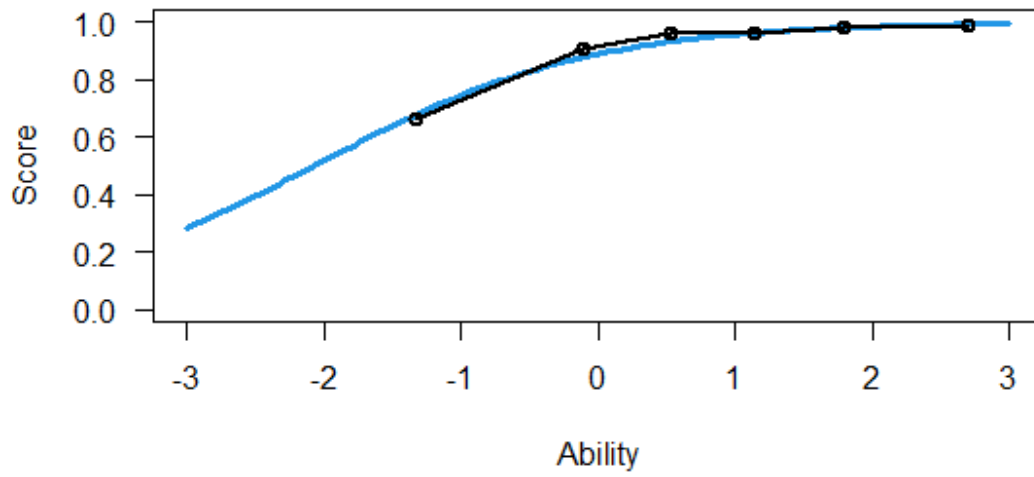
**Expected Scores Curve - Item Q4**



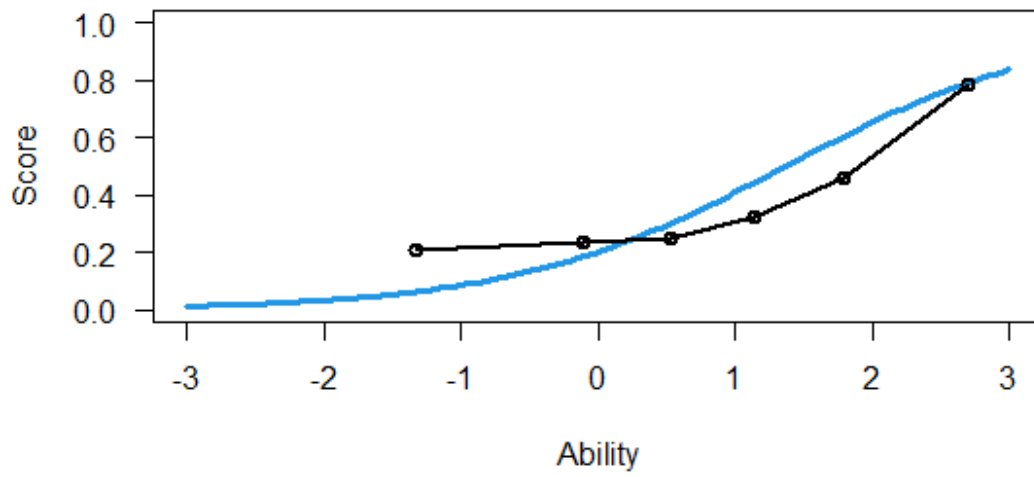
**Expected Scores Curve - Item Q5**



**Expected Scores Curve - Item Q6**

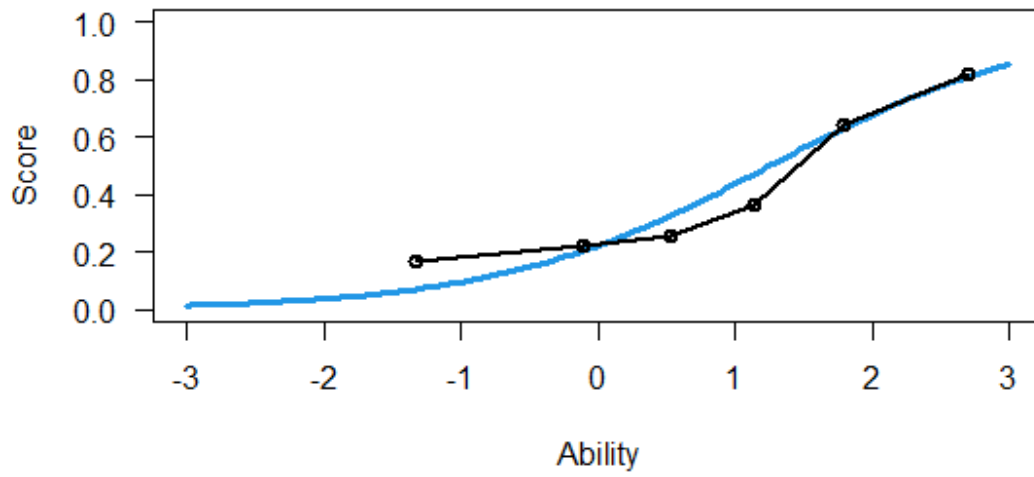


**Expected Scores Curve - Item Q7**

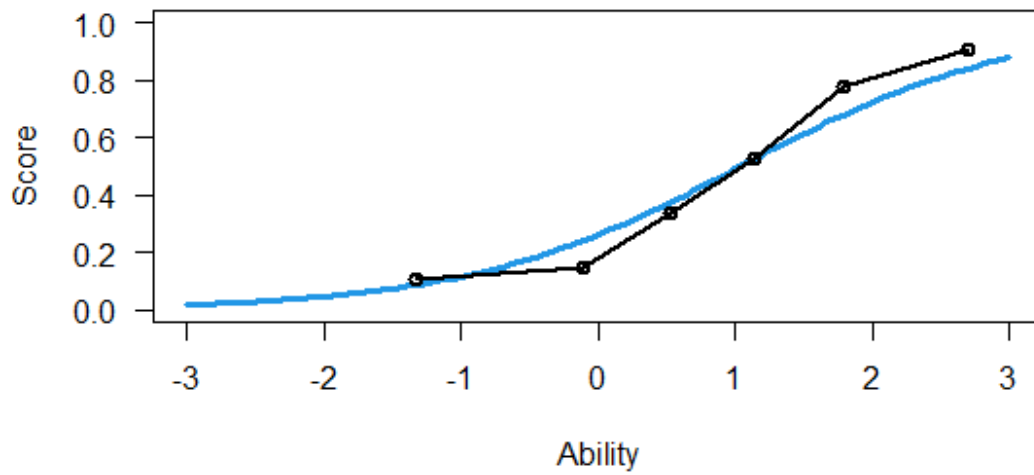




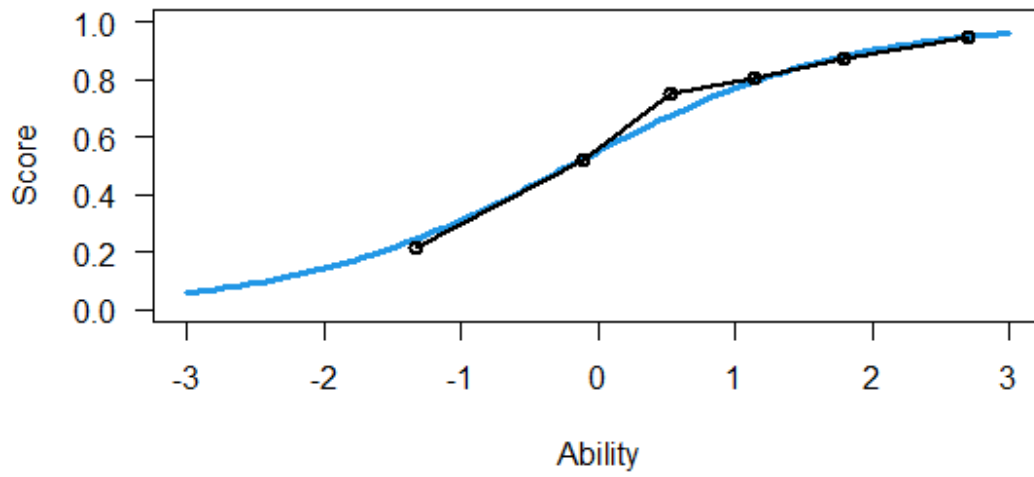
**Expected Scores Curve - Item Q8**



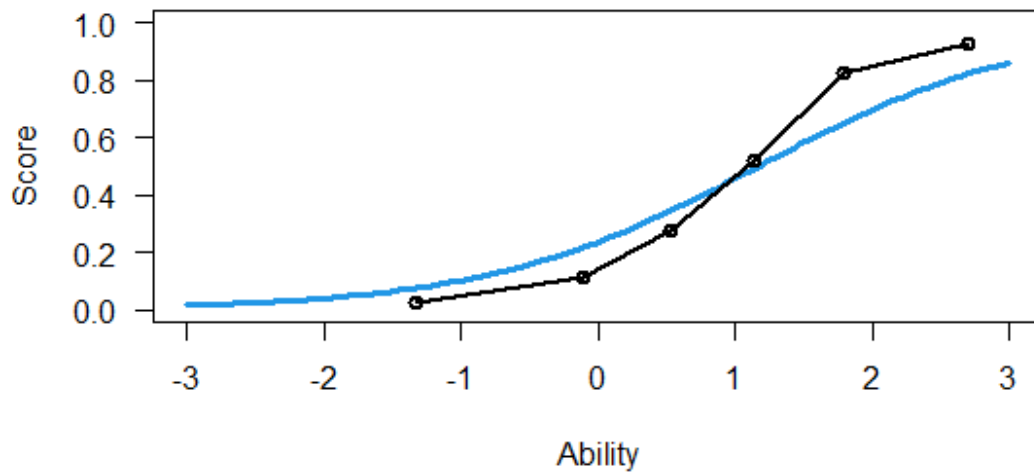
**Expected Scores Curve - Item Q9**



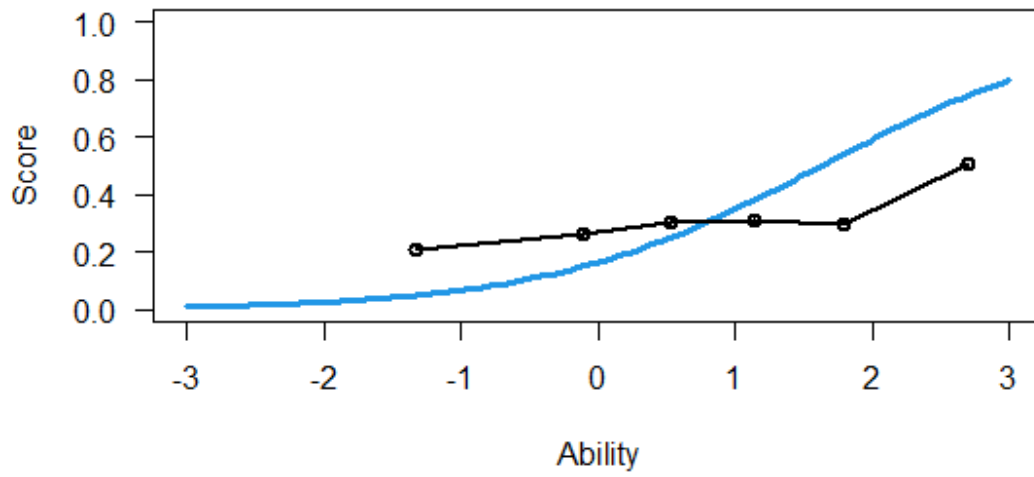
**Expected Scores Curve - Item Q10**



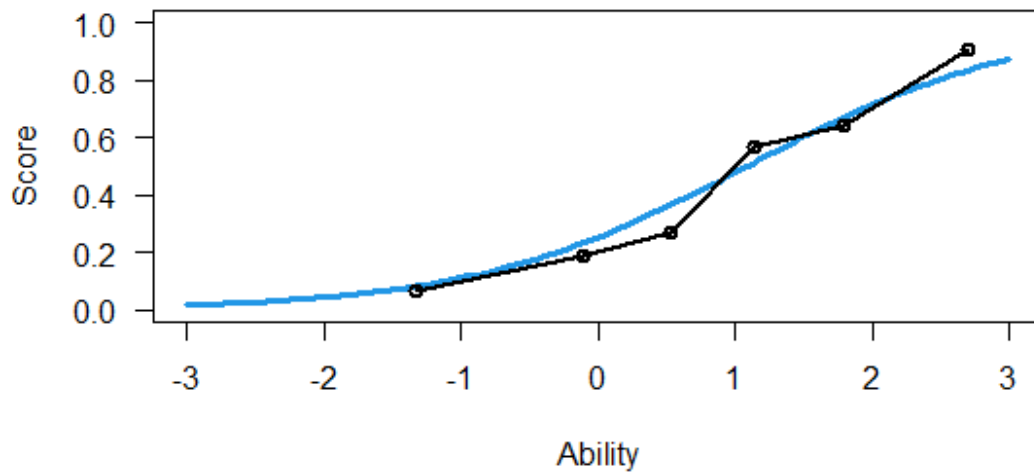
**Expected Scores Curve - Item Q11**



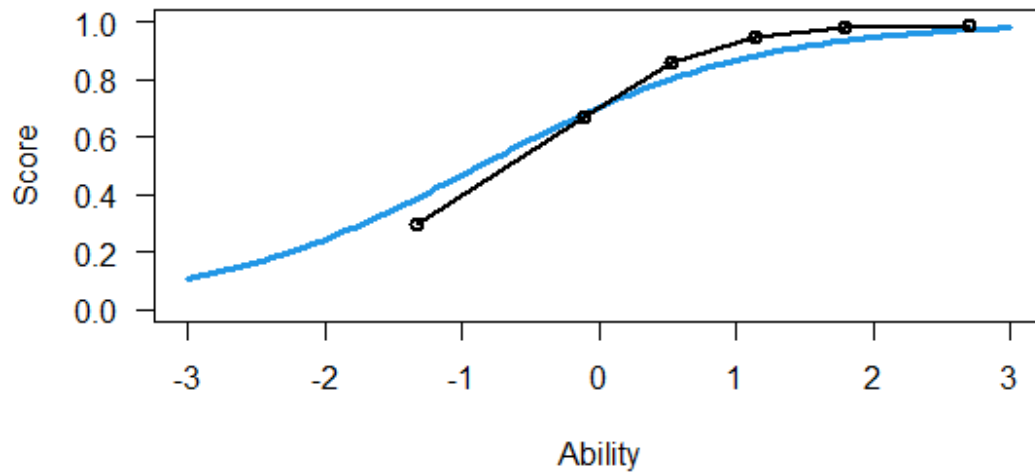
**Expected Scores Curve - Item Q12**



**Expected Scores Curve - Item Q13**



### Expected Scores Curve - Item Q14



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### Save Rasch item difficulty results to a csv file

Finally, IRT item difficulty values will be saved to a csv file which may be used with Excel, or simply viewed with a text editor such as Notepad (Windows), or TextEdit (Mac).

The name of the file is seen within quotation marks below. ('TAM' is the name of the program used to compute the IRT statistics used in this report. 'Mod1' in TAM specifies the Rasch Model. Read about TAM [here](#).)

Note: if the file already exists, an error message may be displayed.

```
write.csv(mod1$item1$ksi.item,"TAM_Mod1_item_diffs.csv") # Will be saved to  
the working folder.
```