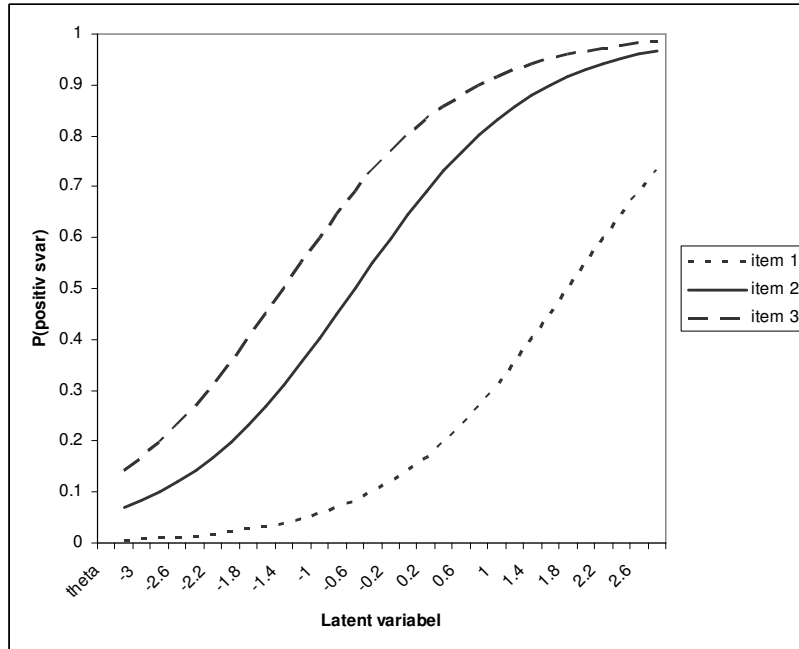


Exercises IRT

Exercise 1.

Read the parameter for item difficulty/item location from the graph below, which shows three items from a one parameter logistic model (Rasch model)

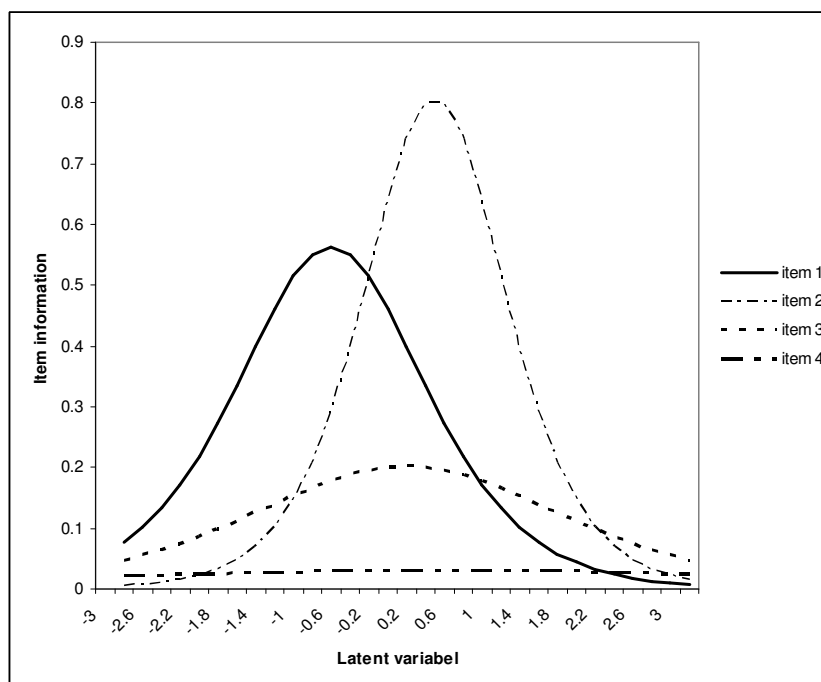


Insert the horizontal line at 0.5 on the y-axis. The point on the x-axis where this line intersects with the three curves, respectively is the parameter.

Item 1: $\beta = -1.3$, Item 2: $\beta = -0.5$, Item 3: $\beta = 1.9$.

Exercise 2.

The graph below shows the item information from four items.



These four items relate to reading ability. Consider you were a test developer and your agenda were to find one item to be used in a test directed toward persons with reading problems. Which item for these four would you choose and why?

First, you need to identify what a higher value of the latent variable means: a better reader or a worse one? You have no information on this so you make a choice. Here I assume a higher value correspond to a better reader. This means that the new one-item test should discriminate between readers on the left-hand side of the figure.

Secondly, you need to identify “the problem range”. What range corresponds to bad readers: persons with values of the latent variable in the range -3 to -2, or with values below -1? Again you have to make a choice. I chose values below -1. The item with the highest item information at the range -3 to -1 is item 1.

On the other hand if you should make an one-item test to differentiate between competent readers, which of the four would you prefer and why?

Again I choose to view a higher value of the latent variable to mean a better reader. For the sake of argument I chose the range indicating competent readers to be above 2.6. The item with the highest item information is item 3 but only marginally. None of the 4 items would be a optimal choice at that range.

Exercise 3.

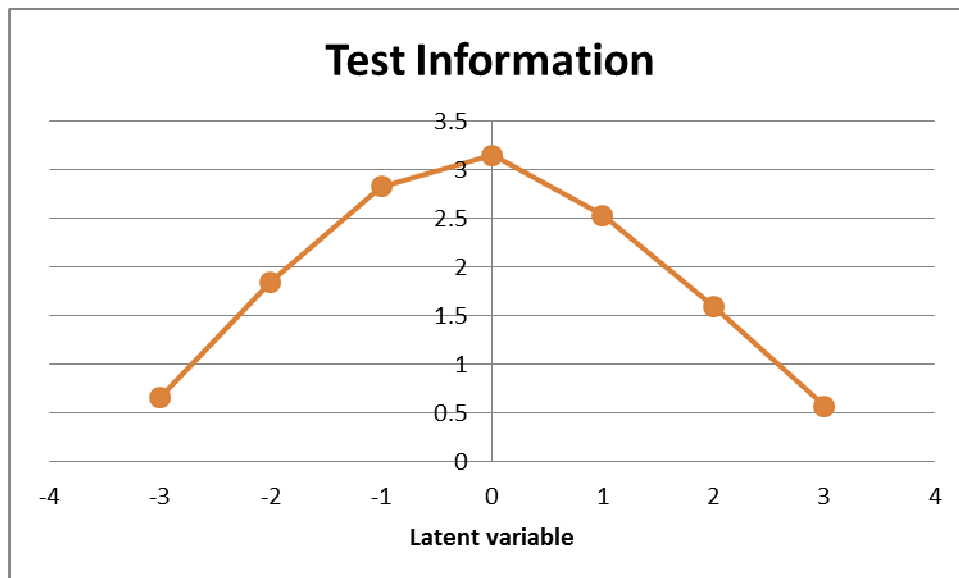
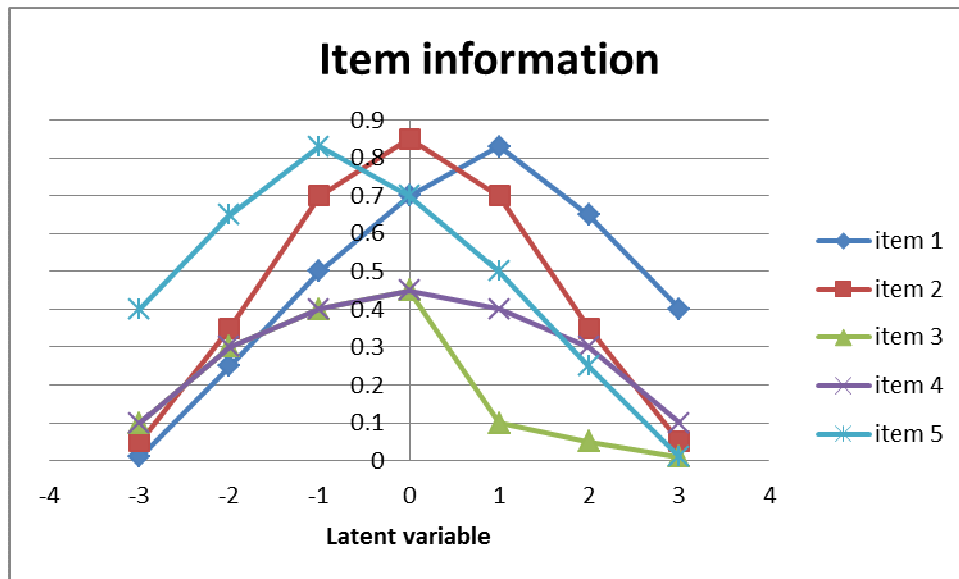
Figur Item information

Item	Latent variabel						
	-3	-2	-1	0	1	2	3
1	0.01	0.25	0.50	0.70	0.83	0.65	0.40
2	0.05	0.35	0.70	0.85	0.70	0.35	0.05
3	0.10	0.30	0.40	0.45	0.10	0.05	0.01
4	0.10	0.30	0.40	0.45	0.40	0.30	0.10
5	0.40	0.65	0.83	0.70	0.50	0.25	0.01

A test consists of the five items in the table above. The table presents item information for each item at seven different values for the latent trait.

Calculate the test information at the seven values of the latent trait.

I have drawn each item information curve, see the figure below. The value of the test information at a specific value of the latent variable is calculated as the sum of all item information's at that value. So you sum each column. See figure below.



If you were to reduce this test to a four item test based in item information, which one would you omit?

When you look at the table or the figure with item information you see that item 3 and item 4 have identical information for values of the latent variable -3 to 0. For all the remaining values of the latent variable item 3 have lower values of information than item 4. Item 3 would be the choice for omission.