1. Using the item parameters given in the Table, compute the item information functions as well as test information function for $-3 \le \theta \le 3$ with $\Delta\theta = .5$. Plot each item information and the corresponding SE. Also, plot the test information function.

Item	α_i	β_i
1	2.0	-1.0
2	1.5	-.5
3	1.5	.0
4	1.5	.5
5	2.0	1.0

2. a. For each of the six items given in the Table below, determine the value of θ for which the information function is a maximum, and determine the maximum values of the information.

	Item Parameter		
Test Item	β_i	α_i	c_i
1	1.00	1.80	.00
2	1.00	.80	.00
3	1.00	1.80	.25
4	-1.50	1.80	.00
5	-.50	1.20	.10
6	.50	.40	.15

   b. Which item would you choose to make up a two-item test that will be most useful for making decisions about examinees at $\theta = 1.0$? What is the value of the test information function for the two-item test at this value of θ?

3. The item parameters (obtained using a 2PL model) for four items are given in the Table below. The maximum likelihood estimate of an examinee who takes this four-item test is 1.5.

   a. Determine the standard error of the estimate.
   b. Construct a 95% confidence interval for θ.

Item	β_i	α_i
1	.00	1.00
2	1.00	1.00
3	1.00	2.00
4	1.50	2.00

4. Fit 3PL model to the dataset (“sample.dat”) using the mirt package. Report item parameter

estimates (& SE) and item level fit statistics. Note that the data file contains ids (first 4 columns) and 40 item responses (0 and 1).