

Exercise 1

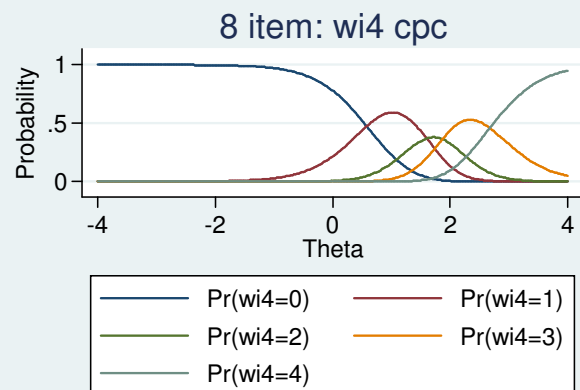
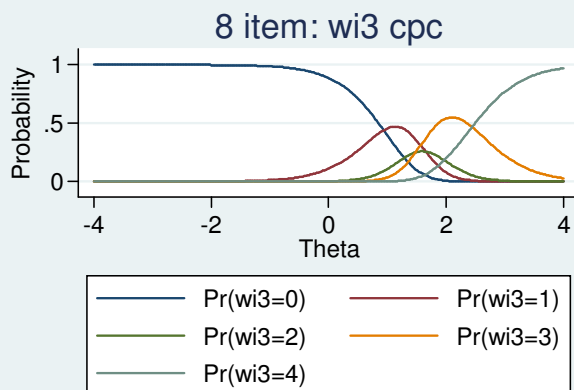
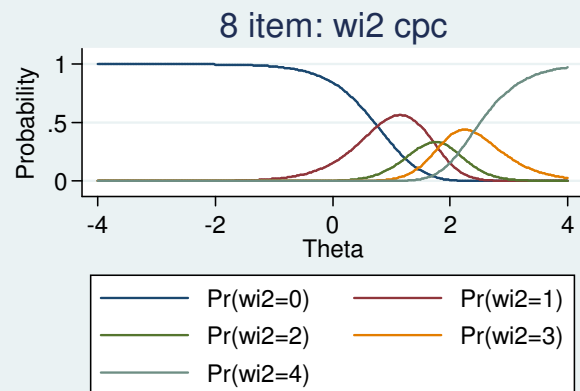
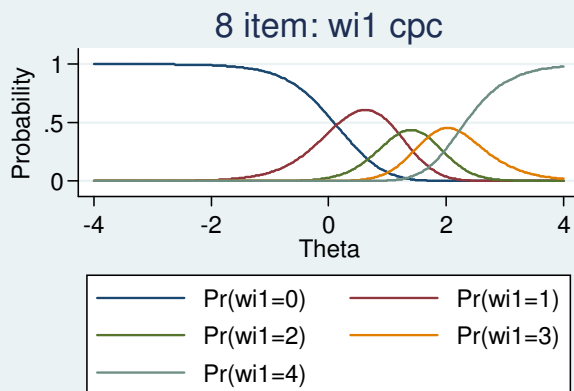
Estimate a partial credit model for all 8 items. Inspect all CPC curves. Are any of them displaying problems with ordering of the response categories?

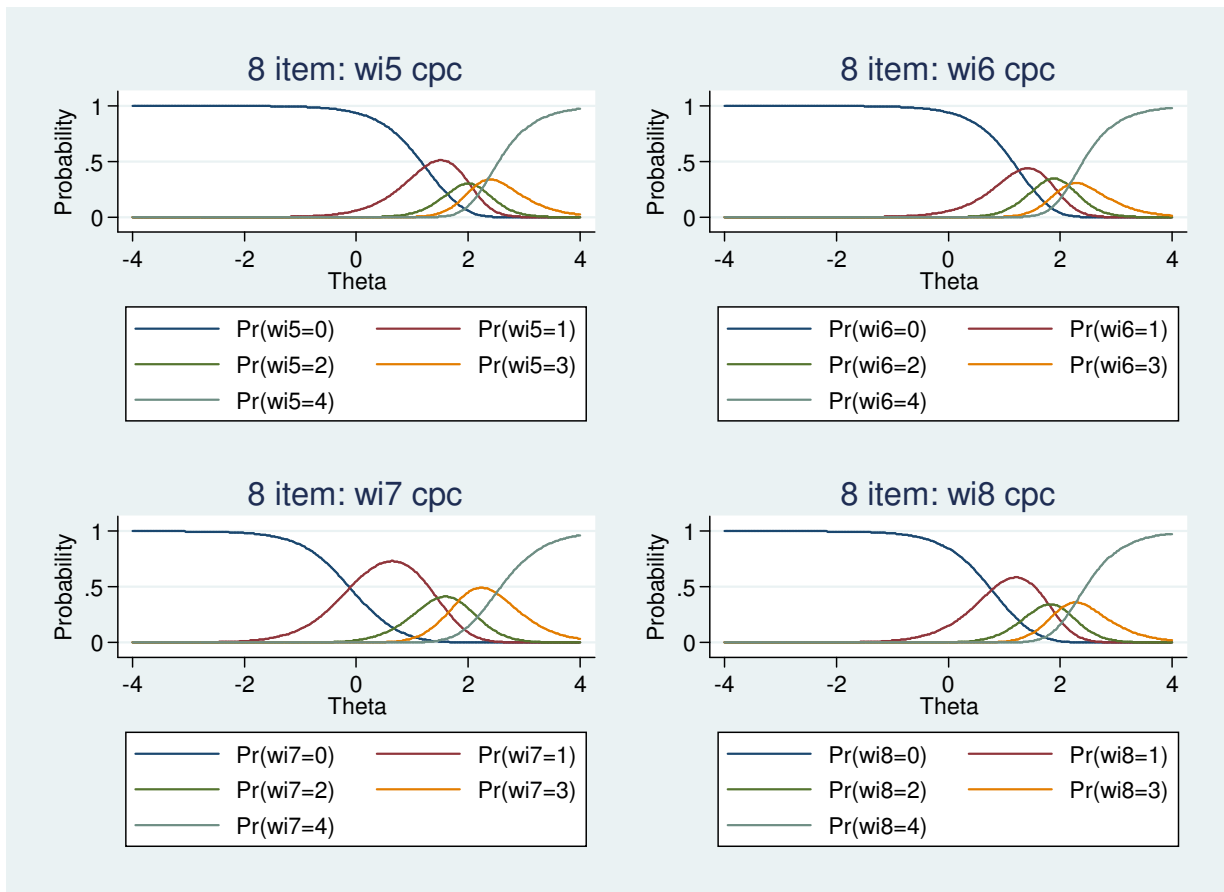
```
* partial credit model  
irt pcm wi1-wi8
```

```
* the cpc graphs
```

```
irtgraph icc wi1, title("8 item: wi1 cpc") name(cpc_wi1, replace)  
irtgraph icc wi2, title("8 item: wi2 cpc") name(cpc_wi2, replace)  
irtgraph icc wi3, title("8 item: wi3 cpc") name(cpc_wi3, replace)  
irtgraph icc wi4, title("8 item: wi4 cpc") name(cpc_wi4, replace)  
irtgraph icc wi5, title("8 item: wi5 cpc") name(cpc_wi5, replace)  
irtgraph icc wi6, title("8 item: wi6 cpc") name(cpc_wi6, replace)  
irtgraph icc wi7, title("8 item: wi7 cpc") name(cpc_wi7, replace)  
irtgraph icc wi8, title("8 item: wi8 cpc") name(cpc_wi8, replace)
```

```
graph combine cpc_wi1 cpc_wi2 cpc_wi3 cpc_wi4  
graph export cpc_1-4.wmf, replace  
graph combine cpc_wi5 cpc_wi6 cpc_wi7 cpc_wi8  
graph export cpc_5-8.wmf, replace
```





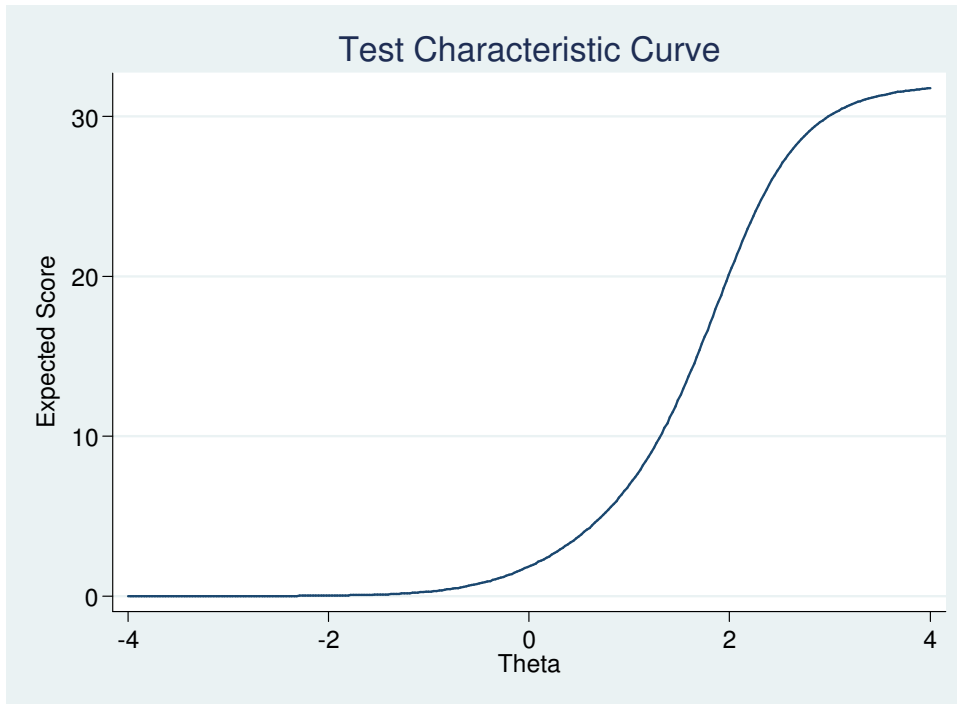
Here item wi_3 , wi_5 , and wi_6 show that there are some problems, most evident for item wi_3 .

Exercise 2

Make the test characteristic curve.

* partial credit model
irt pcm wi_1 - wi_8

* the tcc graph
irtgraph tcc



Exercise 3

Investigate if there is DIF for gender using the ordinal logistic regression method.

* DIF via ordinal logistic regression

* Non-uniform DIF

ologit wi1 b1.gender##c.score_whiteley8, or
ologit wi2 b1.gender##c.score_whiteley8, or
ologit wi3 b1.gender##c.score_whiteley8, or
ologit wi4 b1.gender##c.score_whiteley8, or
ologit wi5 b1.gender##c.score_whiteley8, or
ologit wi6 b1.gender##c.score_whiteley8, or
ologit wi7 b1.gender##c.score_whiteley8, or
ologit wi8 b1.gender##c.score_whiteley8, or

```
. ologit wi8 b1.gender##c.score_whiteley8, or
```

```
Iteration 0: log likelihood = -391.42892
Iteration 1: log likelihood = -275.4251
Iteration 2: log likelihood = -220.24178
Iteration 3: log likelihood = -200.91598
Iteration 4: log likelihood = -200.16677
Iteration 5: log likelihood = -200.16316
Iteration 6: log likelihood = -200.16316
```

```
Ordered logistic regression                Number of obs    =          478
                                           LR chi2(3)       =          382.53
                                           Prob > chi2      =          0.0000
Log likelihood = -200.16316                Pseudo R2        =          0.4886
```

wi8	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
gender						
Female	1.520837	.6762087	0.94	0.346	.6362287	3.635397
score_whit~8	2.033336	.1277835	11.29	0.000	1.797695	2.299864
gender#						
c.						
score_whit~8						
Female	.8660421	.0537623	-2.32	0.021	.766828	.9780927
/cut1	3.649343	.3573054			2.949038	4.349649
/cut2	7.82201	.613519			6.619534	9.024485
/cut3	11.24795	.9749002			9.337178	13.15872
/cut4	15.35925	1.522925			12.37438	18.34413

Only wi8 had a statistical significant interaction term (0.021), the magnitude of the OR did not appear alarming.

* Uniform DIF

```
ologit wi1 b1.gender c.score_whiteley8, or
ologit wi2 b1.gender c.score_whiteley8, or
ologit wi3 b1.gender c.score_whiteley8, or
ologit wi4 b1.gender c.score_whiteley8, or
ologit wi5 b1.gender c.score_whiteley8, or
ologit wi6 b1.gender c.score_whiteley8, or
ologit wi7 b1.gender c.score_whiteley8, or
ologit wi8 b1.gender c.score_whiteley8, or
```

None had p-value below 0.05 for the coefficient for gender. Also none of the OR was outside the interval 0.65-1.53. When we applied the ordinal logistic regression method it seems that the 8 items do not display DIF according to gender.