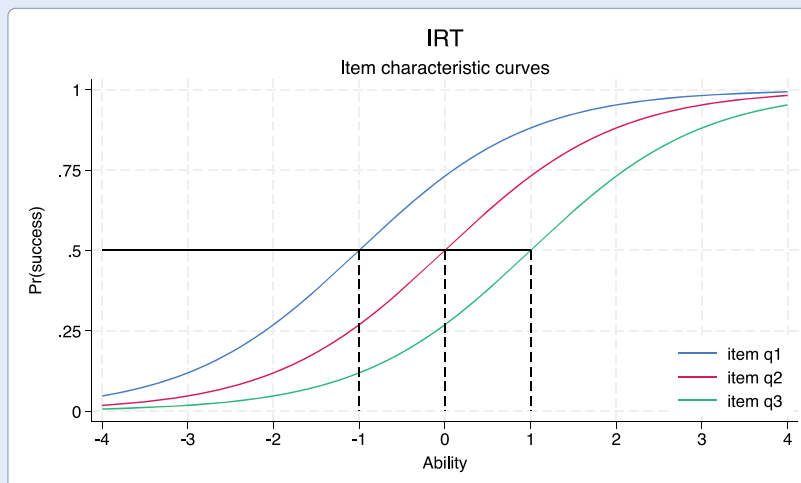


# Item response theory (IRT)

- Binary response models
  - One-parameter logistic (1PL)
  - Two-parameter logistic (2PL)
  - Three-parameter logistic (3PL)
- Ordinal response models
  - Graded response
  - Partial credit
  - Rating scale
- Categorical response models
  - Nominal response
- Hybrid models with differing response types
- Multiple-group models
- Graphs
  - Item characteristic curve
  - Test characteristic curve
  - Item information function
  - Test information function
- Differential item functioning (DIF)



## Fit the model

1PL model for items **q1–q8**

```
. irt 1pl q1-q8
```

2PL model for **q1–q8**

```
. irt 2pl q1-q8
```

Partial credit model for **q9–q15**

```
. irt pcm q9-q15
```

Rating scale model for **q9–q15**

```
. irt rsm q9-q15
```

Graded response model for **q9–q15**

```
. irt grm q9-q15
```

Hybrid model

```
. irt (2pl q1-q8) (grm q9-q15)
```

Multiple-group model

```
. irt 2pl q1-q8, group(grp)
```

Viewer - view irt1.smcl

view irt1.smcl X

+ Dialog ▾ Also see ▾ Jump to ▾

```
. irt 1pl q1-q8
```

One-parameter logistic model  
Log likelihood = -3669.4715

Number of obs = 800

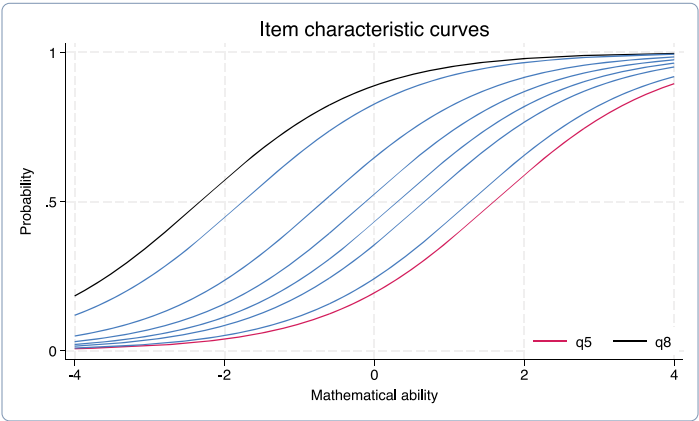
		Coefficient	Std. err.	z	P> z	[95% conf. interval]
	Discrim	.8926881	.0497697	17.94	0.000	.7951412 .990235
q1	Diff	-.6826695	.1000551	-6.82	0.000	-.8787739 -.486565
q2	Diff	-.1177849	.0930488	-1.27	0.206	-.3001572 .0645875
q3	Diff	-1.754276	.1356766	-12.93	0.000	-2.020197 -1.488355
q4	Diff	.3101872	.0943281	3.29	0.001	.1253074 .4950669
q5	Diff	1.595213	.1288328	12.38	0.000	1.342705 1.847721
q6	Diff	.6694488	.0997334	6.71	0.000	.4739748 .8649227
q7	Diff	1.279229	.1167531	10.96	0.000	1.050397 1.508061
q8	Diff	-2.328184	.1640633	-14.19	0.000	-2.649742 -2.006625

CAP NUM INS

# Graph the results

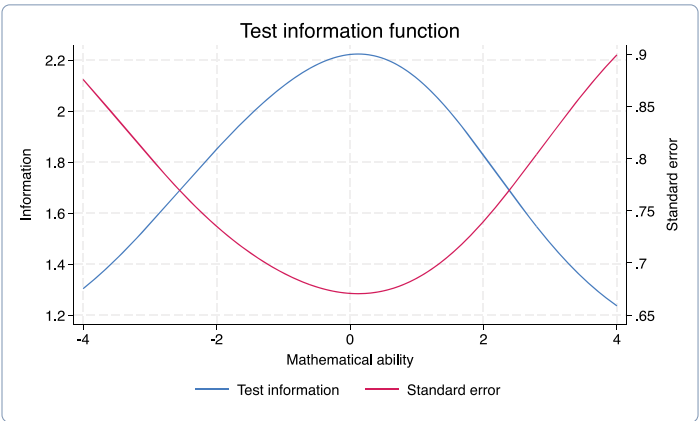
Item characteristic curves

```
. irtgraph icc ...
```



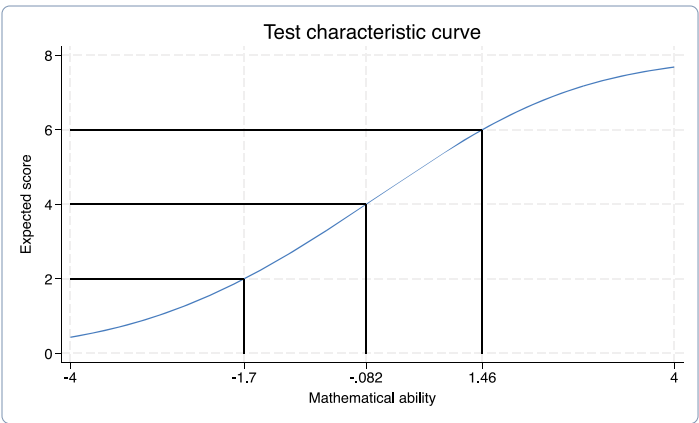
Test information function

```
. irtgraph tif, se
```



Test characteristic curve

```
. irtgraph tcc, scorelines(2 4 6)
```



# Explore the results

Sort items by difficulty

Viewer - view irt2.smcl

view irt2.smcl

Dialog Also see Jump to

. estat report, sort(b) byparm

One-parameter logistic model Number of obs = 800  
Log likelihood = -3669.4715

	Coefficient	Std. err.	z	P> z	[95% conf. interval]
Discrim	.8926881	.0497697	17.94	0.000	.7951412 .990235
Diff					
q8	-2.328184	.1640633	-14.19	0.000	-2.649742 -2.006625
q3	-1.754276	.1356766	-12.93	0.000	-2.020197 -1.488355
q1	-.6826695	.1000551	-6.82	0.000	-.8787739 -.486565
q2	-.1177849	.0930488	-1.27	0.206	-.3001572 .0645875
q4	.3101872	.0943281	3.29	0.001	.1253074 .4950669
q6	.6694488	.0997334	6.71	0.000	.4739748 .8649227
q7	1.279229	.1167531	10.96	0.000	1.050397 1.508061
q5	1.595213	.1288328	12.38	0.000	1.342705 1.847721

CAP NUM INS

# Use commands or the IRT Control Panel

irt - Item response theory (IRT) models

Start command log

Model

Report

Graph

DIF

Finish

Models

Binary item models

☒ One-parameter logistic model (1PL)

☐ Two-parameter logistic model (2PL)

☐ Three-parameter logistic model (3PL)

Ordered item models

☐ Graded response model (GRM)

☐ Partial credit model (PCM)

☐ Generalized partial credit model (GPCM)

☐ Rating scale model (RSM)

Unordered categorical item model

☐ Nominal response model (NRM)

Hybrid models

☐ Hybrid models

Items:

q1 q2 q3 q4 q5 q6 q7 q8

Group variable:

Fit model

Advanced options

Model: One-parameter logistic model

Close