Questions and answers for Chapter 11

1. You want to find out whether the items relating to attitudes to school (attsc1 to attsc5) form a factor. Do this in SPSS.

    Follow the instructions in Chapter 11 using variables attsc1 to attsc5.

2. How many factors will you extract? Why?

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.346	46.913	46.913	2.346	46.913	46.913
2	.828	16.569	63.481			
3	.749	14.979	78.460			
4	.621	12.423	90.883			
5	.456	9.117	100.000			

Extraction Method: Principal Component Analysis.
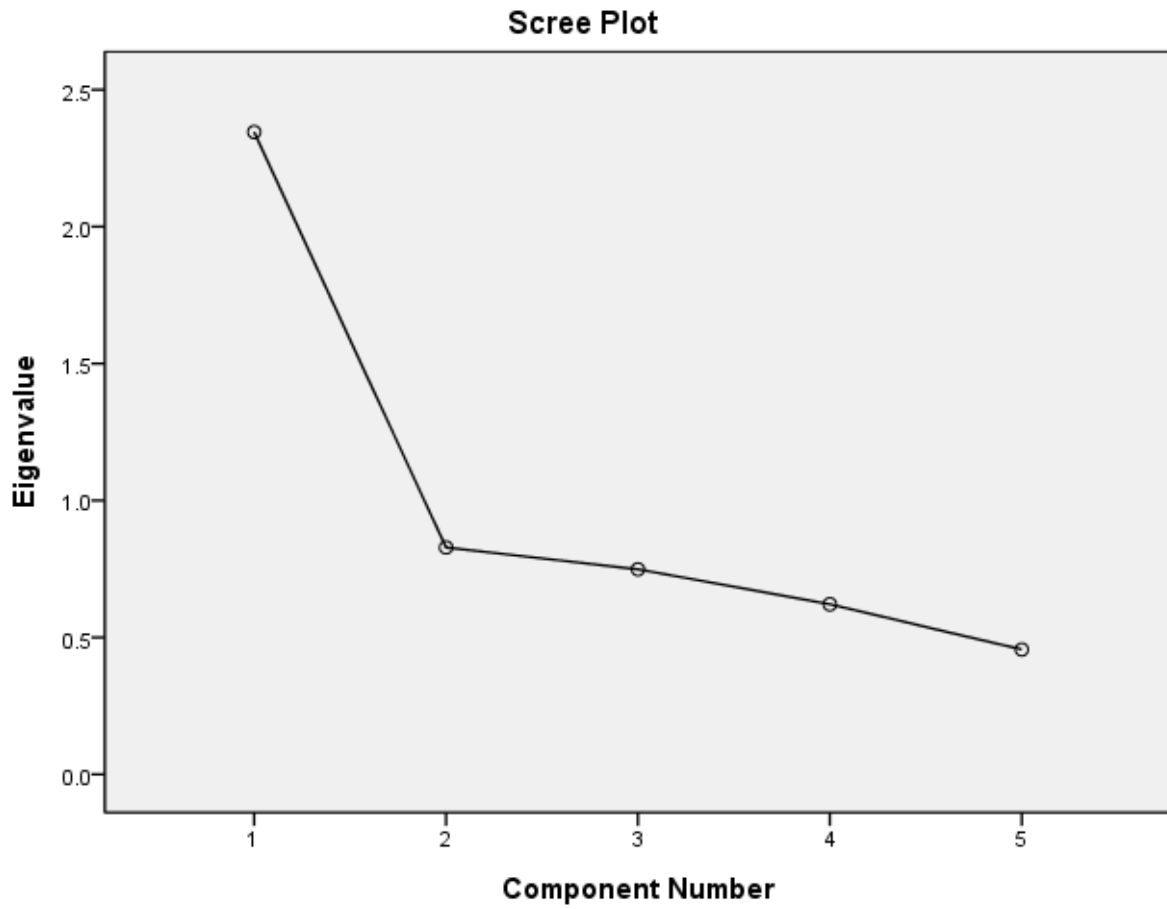
Scree Plot

The findings clearly suggest extracting just one factor. There is only one Eigenvalue (well) over 1, and the scree plot likewise levels of strongly after 1 factor.

3. What are the factor loadings telling you?

Component Matrix[a]

	Component
	1
school is fun	.777
school is boring	.762
school is the same day after day	.646
sorry when school's out	.632
teachers don't try hard enough	.587

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

All five variables clearly load on the factor, with most being above .6. 'Teachers don't try hard enough' has a somewhat lower loading, but is still well above .5. The one factor structure appears to fit the data well. Note that if we have only one factor there is no rotation.

4. Now try and extract two factors. What does this tell you?

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.346	46.913	46.913	2.346	46.913	46.913	1.930
2	.828	16.569	63.481	.828	16.569	63.481	1.785
3	.749	14.979	78.460				
4	.621	12.423	90.883				
5	.456	9.117	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Component	
	1	2
teachers don't try hard enough	.833	.154
school is the same day after day	.682	-.082
school is boring	.568	-.349
sorry when school's out	-.123	-.927
school is fun	.312	-.644

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Extracting two factors has increased explained variance, from 46.9% to 63.5%. Looking at the pattern matrix after rotation (we have used oblimin as we would expect the factors to be correlated with one another) two factors have been extracted. Looking at the items, they are interpretable, as factor 1 contains negatively worded statements, and factor 2 contains positively worded statements. However, two of the five items, 'school is fun' and 'school is boring' have loadings over 3 on both factors, so overall the one factor solution provides a better fit.

5. Would the five variables measuring attitudes to school form an internally consistent scale? Why?

To look at internal consistency we calculate Cronbach's Alpha.

Reliability Statistics

Cronbach's Alpha	N of Items
.709	5

The Cronbach's Alpha we get is .71. This is just above .7, so acceptable for research purposes, though it does not suggest excellent internal consistency.

6. Would internal consistency improve if we left any of the five variables out of the scale?

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
school is boring	10.58	9.304	.550	.628
school is fun	10.48	9.019	.573	.617
school is the same day after day	10.86	9.889	.433	.674
teachers don't try hard enough	10.44	9.736	.380	.699
sorry when school's out	11.17	9.834	.412	.683

Looking at 'Cronbach's Alpha if scale deleted', we can see that taking any of the five variables out of the scale would lower Cronbach's Alpha rather than increase it, so we are better off with the five items.