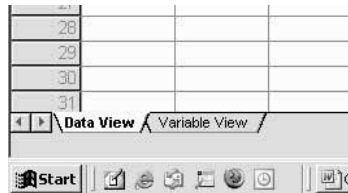

3.8.1. Are my data parametric?

EXAMPLE 3.2. Length (mm) of two-spot ladybirds (*Adalia bipunctata*)

BOX 3.2. How to check if your data are normally distributed (parametric)

Step 1. Set up the variables.

When SPSS starts, select the ‘Type in Data’ option. Then choose ‘Variable View’ from the tabs at the bottom left of the screen.



You will see a screen something like this:

A screenshot of the SPSS Variable View window. The title bar reads 'Untitled - SPSS Data Editor'. The menu bar includes 'File', 'Edit', 'View', 'Data', 'Transform', 'Analyze', 'Graphs', 'Utilities', 'Window', and 'Help'. Below the menu bar is a toolbar with various icons. The main area is a table with columns: 'Name', 'Type', 'Width', 'Decimals', 'Label', 'Values', 'Missing', 'Columns', 'Align', and 'Measure'. The table has five rows, numbered 1 to 5, all of which are currently empty.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1										
2										
3										
4										
5										

Each row represents a variable for the analysis.

In the name for variable 1, type 'length' (SPSS won't accept capital letters as parts of a Name). Most of the other characteristics of the variable will be given default values as below:

The screenshot shows the 'Variable View' tab in SPSS. The variable 'length' is defined with the following properties:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	length	Numeric	8	2		None	None	8	Right	Scale
2										

The lengths are to the nearest mm, so we change the 'Decimals' property to zero by clicking in the 'Decimals' window and using the 'up' and 'down' arrows that appear to make the adjustment.

The screenshot shows the 'Variable View' tab in SPSS. The variable 'length' is defined with the following properties:

	Name	Type	Width	Decimals	Label
1	length	Numeric	8	0	
2					

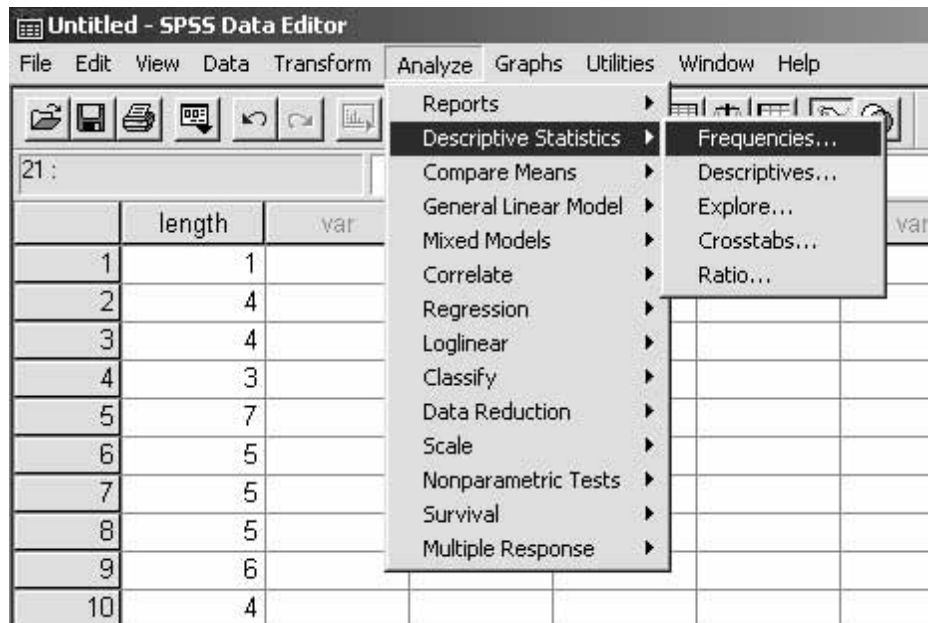
Step 2. Enter the data.

Transfer to data view using the tabs at the bottom left.

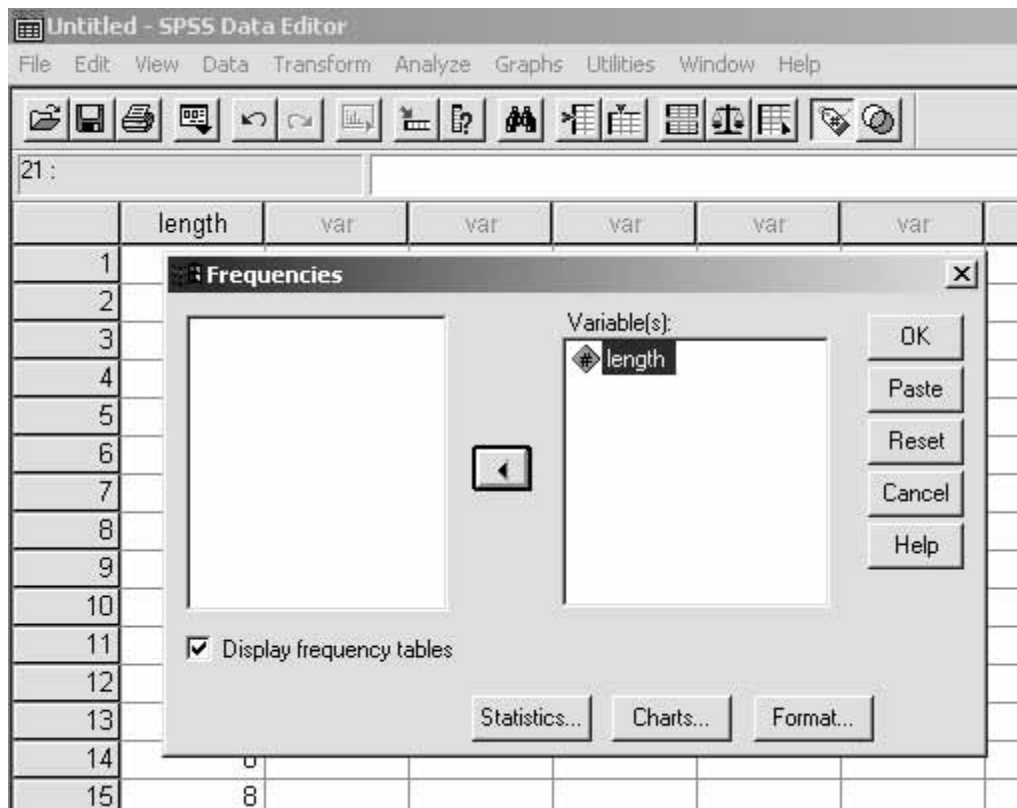
Enter the numerical data into column 1.

	length	var
1	1	
2	4	
3	4	
4	3	
5	7	
6	5	
7	5	
8	5	
9	6	
10	4	
11	2	
12	6	
13	1	
14	8	

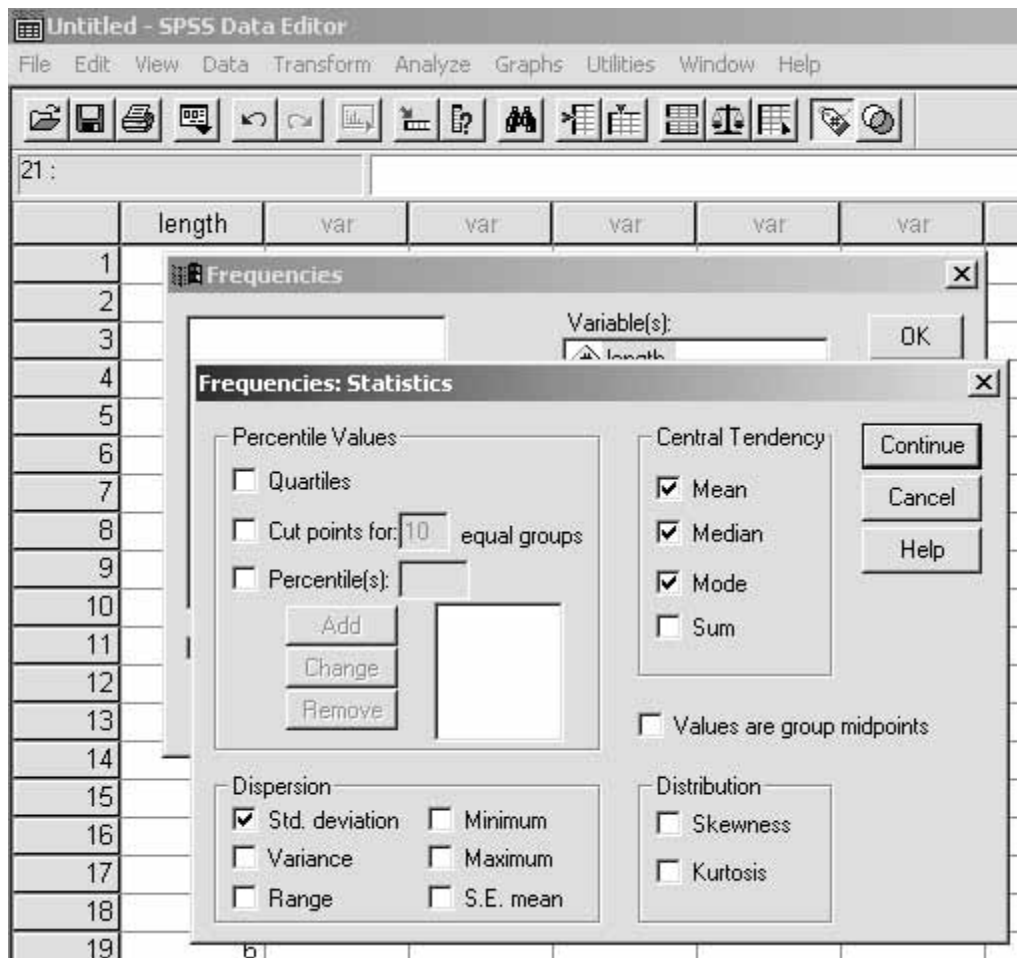
Step 3. Perform the necessary analysis.
Go to 'Analyze', 'Descriptive Statistics', 'Frequencies'.



Highlight 'length' by clicking on it, then transfer it to the 'Variable' window by clicking on the arrow.

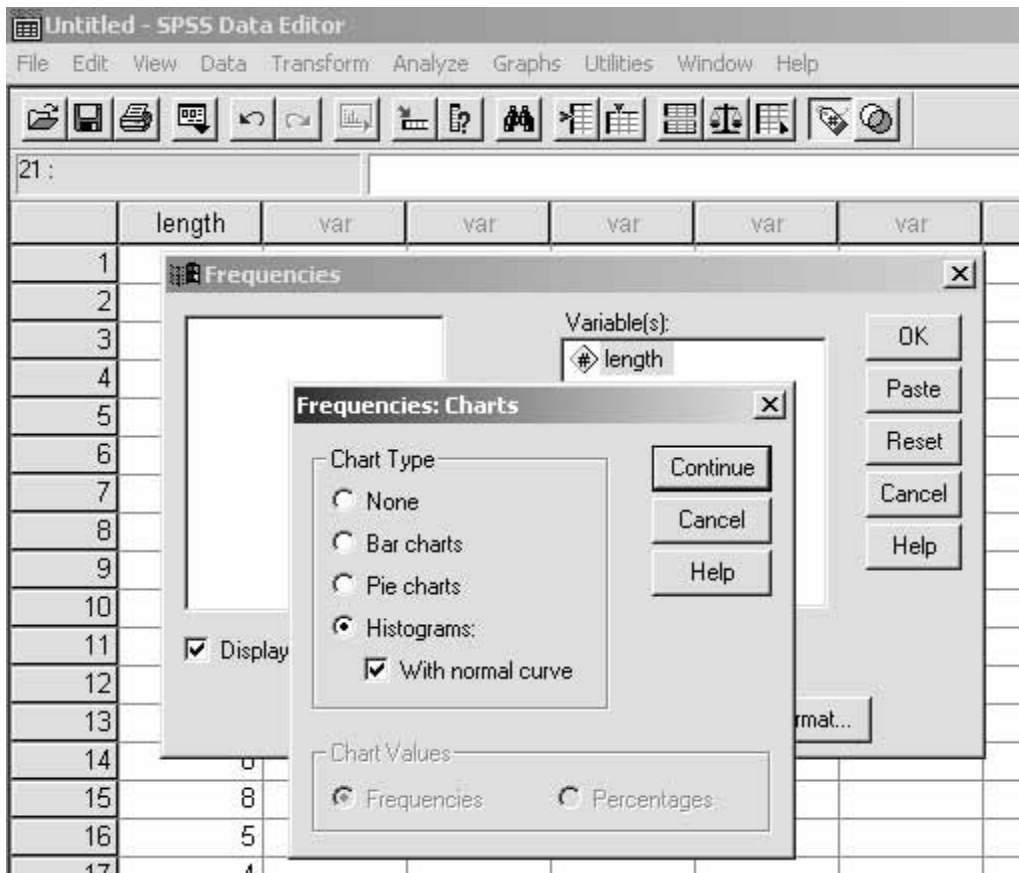


Click on 'Statistics', and select 'Std. deviation', 'Mean', 'Median' and 'Mode'.



Click on 'Continue'.

Click on 'Charts', and select 'Histograms' and 'With normal curve'.



Click on 'Continue', then click on 'OK'. The output will appear in a separate window.

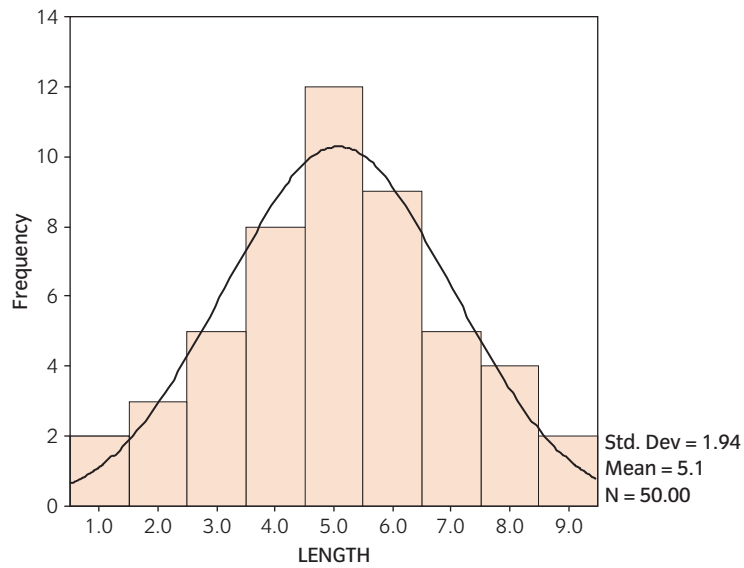
Frequencies

Statistics

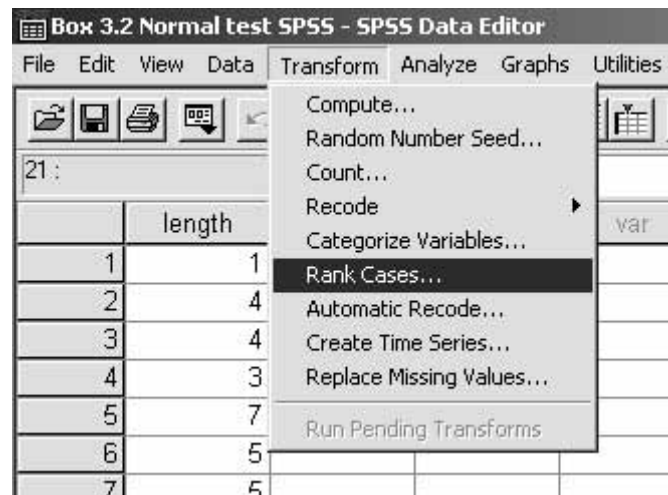
LENGTH		
N	Valid	50
	Missing	0
Mean		5.08
Median		5.00
Mode		5
Std. Deviation		1.936

LENGTH

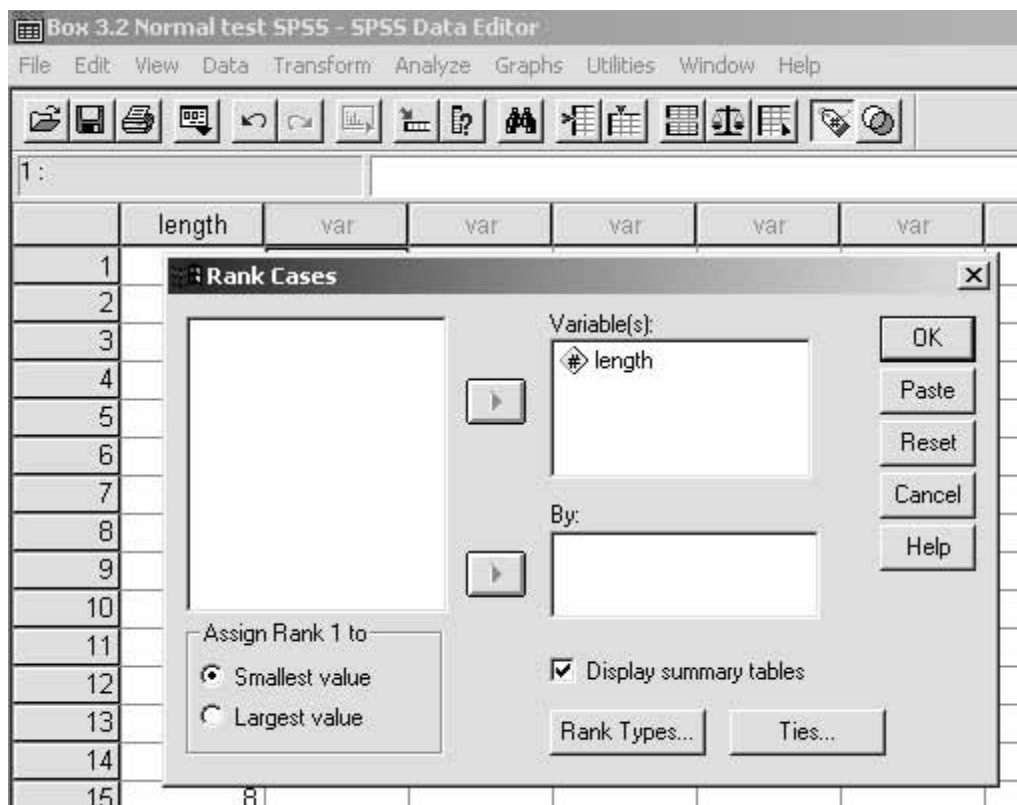
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	4.0	4.0	4.0
	2	3	6.0	6.0	10.0
	3	5	10.0	10.0	20.0
	4	8	16.0	16.0	36.0
	5	12	24.0	24.0	60.0
	6	9	18.0	18.0	78.0
	7	5	10.0	10.0	88.0
	8	4	8.0	8.0	96.0
	9	2	4.0	4.0	100.0
Total		50	100.0	100.0	



We also need the data in ranked order. Go to 'Transform', 'Rank Cases'.



Click on 'length' to highlight it, then click on the arrow to transfer it into the 'Variable(s)' window.



Click on 'OK'. A new variable will be generated with the ranks, and the summary table will appear in the 'Output' window.

Box 3.2 Normal test SPSS - SPSS Data Editor

File Edit View Data Transform Analyze

1 : length 1.5

	length	rlength	v
1	1	1.500	
2	4	14.500	
3	4	14.500	
4	3	8.000	
5	7	42.000	
6	5	24.500	
7	5	24.500	
8	5	24.500	
9	6	35.000	
10	4	14.500	
11	2	4.000	
12	6	35.000	
13	1	1.500	
14	8	46.500	

From	New	
variable	variable	Label
-----	-----	-----
LENGTH	RLENGTH	RANK of LENGTH

Step 4. Go through the individual tests.

- (a) Are the data on an interval scale? Yes – they are measured in mm.
- (b) Does the distribution appear to be a ‘bell-shaped’ curve? Looking at the graph, the answer is ‘yes’.
- (c) Do about 68% of your observations fall within the range $\bar{x} \pm 1 s$?

The mean is 5.080 mm, and the standard deviation is 1.936 mm.

$$\bar{x} \pm 1 s = 5.080 + 1.936 = 7.016$$

$$\bar{x} - 1 s = 5.080 - 1.936 = 3.144$$

The measurements between these are 4, 5, 6, and 7 mm. From the ranking table in column 2, these correspond to ranks of 14.5, 24.5, 35.0, and 42.0. Looking at the table (or reading from the graph) there are 8, 12, 9, and 5 ladybirds in these categories, a total of 34 ladybirds. This is $(34/50) \times 100 = 68\%$ of the total. Thus about 68% of our observations lie in the range $\bar{x} \pm 1 s$.

(d) Does median = mode = mean?

Median = 5.0 mm, mode = 5.0 mm, and mean = 5.080 mm. Thus they are all close together.

(e) For the goodness of fit chi-squared test, see Box 5.2.

From the information we can obtain at this stage, it looks as if the data are normally distributed.