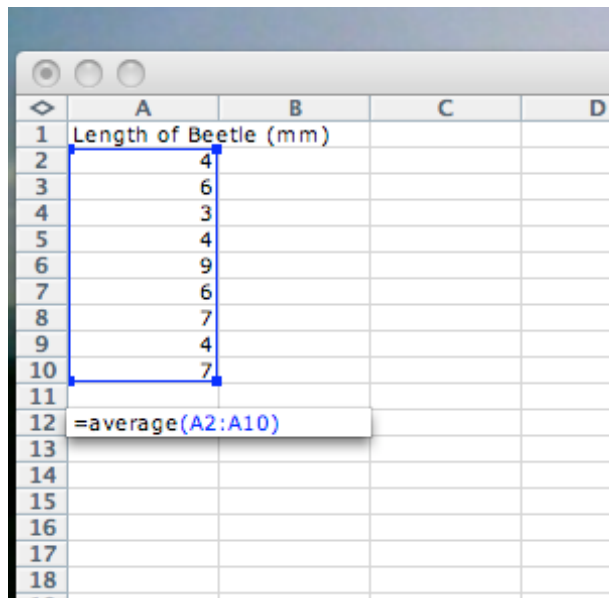


## Analysing data in excel

All of the following commands are found in the data analysis tool pack. Although these have been done on a Apple Mac computer, the basics are the same for all versions of excel – for the later examples the analysis toolpack should be installed (see video for help).

### Measures of central tendency (Averages)

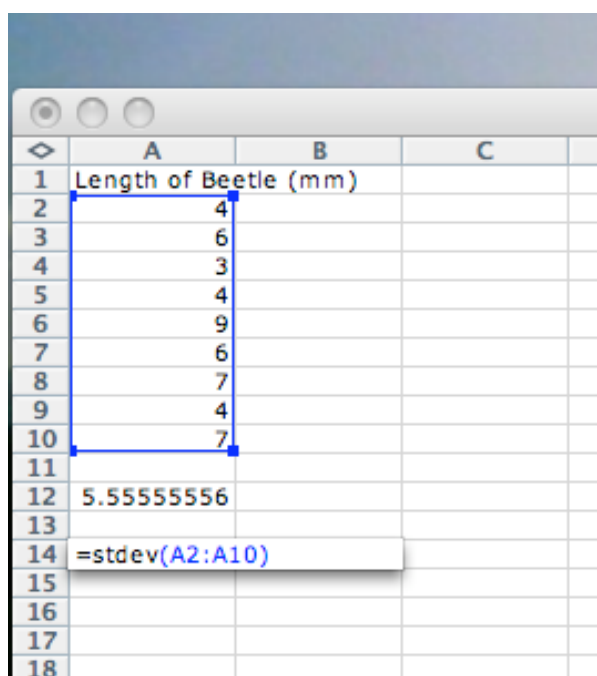


The image shows an Excel spreadsheet with a window titled 'Length of Beetle (mm)'. The data is as follows:

|    | A                     | B | C | D |
|----|-----------------------|---|---|---|
| 1  | Length of Beetle (mm) |   |   |   |
| 2  | 4                     |   |   |   |
| 3  | 6                     |   |   |   |
| 4  | 3                     |   |   |   |
| 5  | 4                     |   |   |   |
| 6  | 9                     |   |   |   |
| 7  | 6                     |   |   |   |
| 8  | 7                     |   |   |   |
| 9  | 4                     |   |   |   |
| 10 | 7                     |   |   |   |
| 11 |                       |   |   |   |
| 12 | =average(A2:A10)      |   |   |   |
| 13 |                       |   |   |   |
| 14 |                       |   |   |   |
| 15 |                       |   |   |   |
| 16 |                       |   |   |   |
| 17 |                       |   |   |   |
| 18 |                       |   |   |   |

Typing in ‘=average(startrange:endrange)’ as in the example above gives the mean beetle length. Instead of average you could also use the commands =median or =mode along with the range of data you are looking at will give the other averages.

### Measures of dispersal



The image shows an Excel spreadsheet with the same data as the previous image, plus the standard deviation result in cell B12:

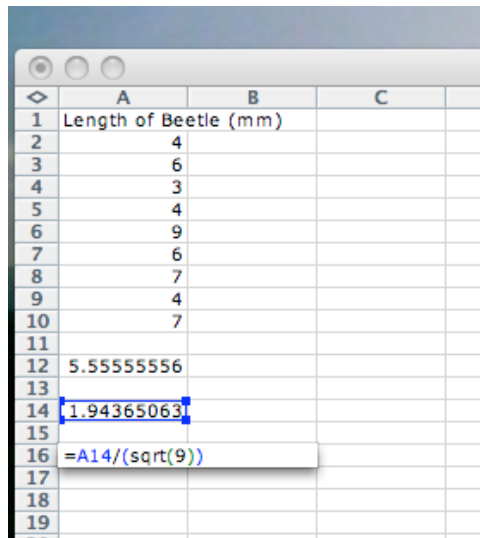
|    | A                     | B | C |
|----|-----------------------|---|---|
| 1  | Length of Beetle (mm) |   |   |
| 2  | 4                     |   |   |
| 3  | 6                     |   |   |
| 4  | 3                     |   |   |
| 5  | 4                     |   |   |
| 6  | 9                     |   |   |
| 7  | 6                     |   |   |
| 8  | 7                     |   |   |
| 9  | 4                     |   |   |
| 10 | 7                     |   |   |
| 11 |                       |   |   |
| 12 | 5.55555556            |   |   |
| 13 |                       |   |   |
| 14 | =stdev(A2:A10)        |   |   |
| 15 |                       |   |   |
| 16 |                       |   |   |
| 17 |                       |   |   |
| 18 |                       |   |   |

This gives the standard deviation of the beetle data.

You could also use the command =var to get the variance

## Measures of precision

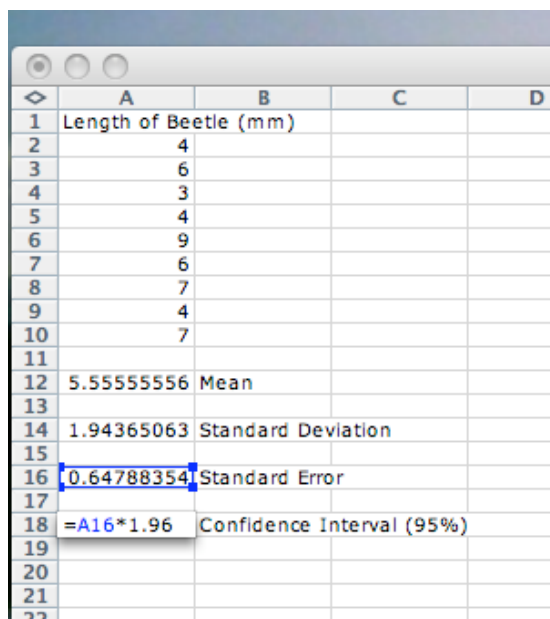
You can calculate the precision of the mean (standard error or confidence intervals) using the following – once the standard deviation has been calculated.



A screenshot of a spreadsheet window. The spreadsheet has columns A, B, and C. Row 1 is labeled 'Length of Beetle (mm)'. Rows 2 through 10 contain the values 4, 6, 3, 4, 9, 6, 7, 4, and 7 respectively. Row 12 shows the mean value 5.55555556. Row 14 shows the standard deviation value 1.94365063, which is highlighted with a blue border. Row 16 shows the formula  $=A14/(sqrt(9))$  in the formula bar, which calculates the standard error.

|    | A                     | B | C |
|----|-----------------------|---|---|
| 1  | Length of Beetle (mm) |   |   |
| 2  | 4                     |   |   |
| 3  | 6                     |   |   |
| 4  | 3                     |   |   |
| 5  | 4                     |   |   |
| 6  | 9                     |   |   |
| 7  | 6                     |   |   |
| 8  | 7                     |   |   |
| 9  | 4                     |   |   |
| 10 | 7                     |   |   |
| 11 |                       |   |   |
| 12 | 5.55555556            |   |   |
| 13 |                       |   |   |
| 14 | 1.94365063            |   |   |
| 15 |                       |   |   |
| 16 | $=A14/(sqrt(9))$      |   |   |
| 17 |                       |   |   |
| 18 |                       |   |   |
| 19 |                       |   |   |

To calculate S.E., the S.D. needs to be divided by the square root of the number of samples (here the number of samples is 9).

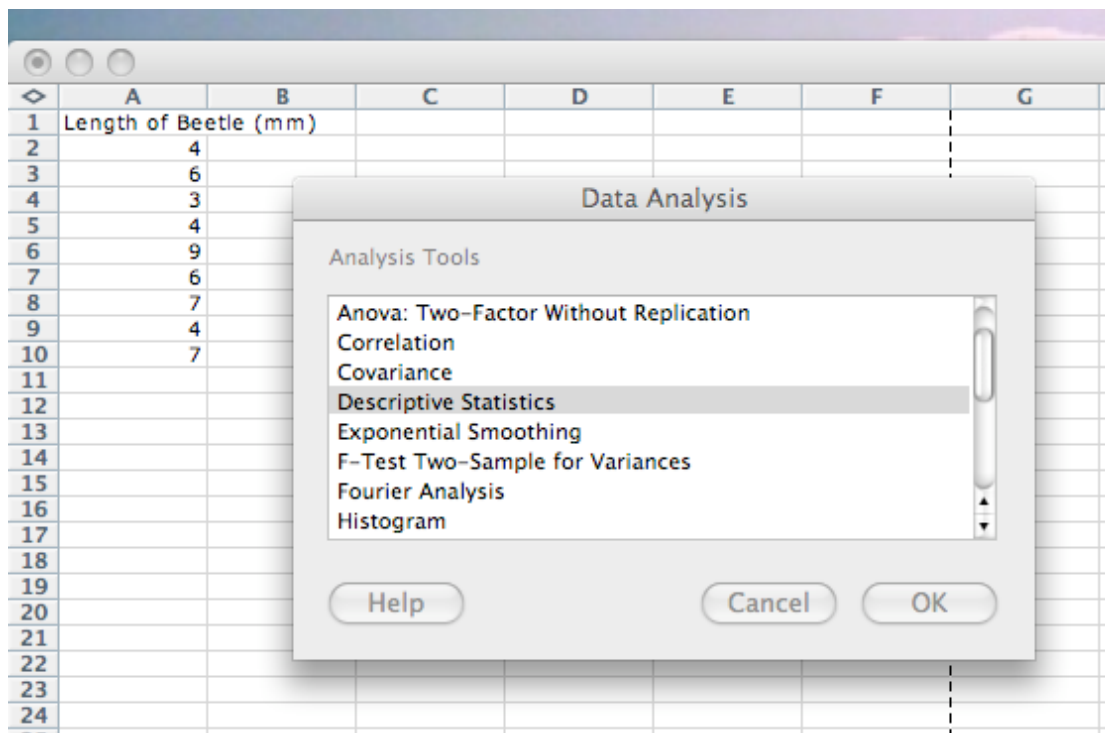


A screenshot of a spreadsheet window. The spreadsheet has columns A, B, C, and D. Row 1 is labeled 'Length of Beetle (mm)'. Rows 2 through 10 contain the values 4, 6, 3, 4, 9, 6, 7, 4, and 7 respectively. Row 12 shows the mean value 5.55555556 with the label 'Mean' in column B. Row 14 shows the standard deviation value 1.94365063 with the label 'Standard Deviation' in column B. Row 16 shows the standard error value 0.64788354 with the label 'Standard Error' in column B. Row 18 shows the formula  $=A16*1.96$  in the formula bar, which calculates the 95% confidence interval, with the label 'Confidence Interval (95%)' in column B.

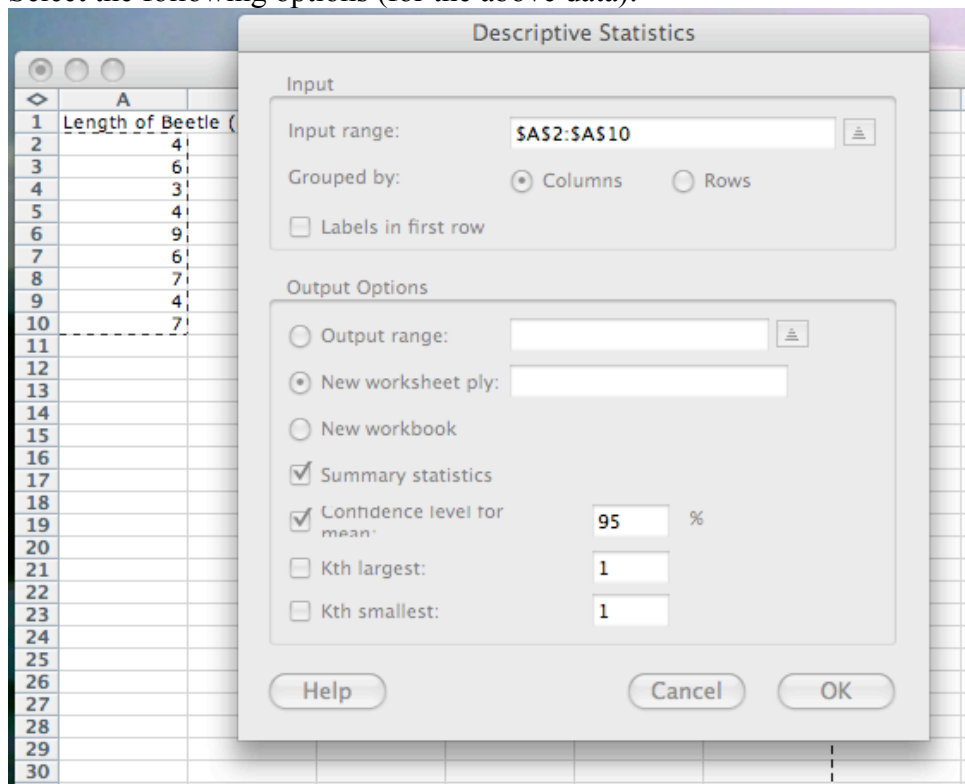
|    | A                     | B                         | C | D |
|----|-----------------------|---------------------------|---|---|
| 1  | Length of Beetle (mm) |                           |   |   |
| 2  | 4                     |                           |   |   |
| 3  | 6                     |                           |   |   |
| 4  | 3                     |                           |   |   |
| 5  | 4                     |                           |   |   |
| 6  | 9                     |                           |   |   |
| 7  | 6                     |                           |   |   |
| 8  | 7                     |                           |   |   |
| 9  | 4                     |                           |   |   |
| 10 | 7                     |                           |   |   |
| 11 |                       |                           |   |   |
| 12 | 5.55555556            | Mean                      |   |   |
| 13 |                       |                           |   |   |
| 14 | 1.94365063            | Standard Deviation        |   |   |
| 15 |                       |                           |   |   |
| 16 | 0.64788354            | Standard Error            |   |   |
| 17 |                       |                           |   |   |
| 18 | $=A16*1.96$           | Confidence Interval (95%) |   |   |
| 19 |                       |                           |   |   |
| 20 |                       |                           |   |   |
| 21 |                       |                           |   |   |
| 22 |                       |                           |   |   |

Confidence intervals can be calculated by multiplying the SE by a given value. For 95% C.I. multiply the S.E. by 1.96

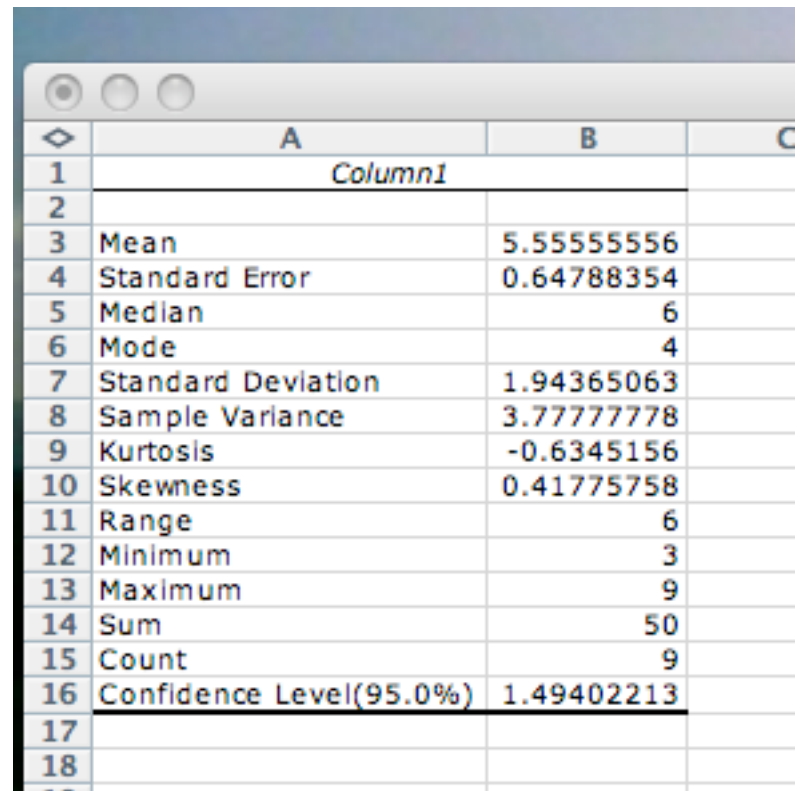
The use of descriptive statistics from the data analysis toolbox can also be useful.



Select the following options (for the above data):



This will give you the following results:



A screenshot of a spreadsheet application window. The window has a title bar with three buttons (minimize, maximize, close) on the left. The spreadsheet has three columns labeled A, B, and C. Column A contains the following text: 'Column1' (row 1), 'Mean' (row 3), 'Standard Error' (row 4), 'Median' (row 5), 'Mode' (row 6), 'Standard Deviation' (row 7), 'Sample Variance' (row 8), 'Kurtosis' (row 9), 'Skewness' (row 10), 'Range' (row 11), 'Minimum' (row 12), 'Maximum' (row 13), 'Sum' (row 14), 'Count' (row 15), and 'Confidence Level(95.0%)' (row 16). Column B contains the following numerical values: 5.55555556 (row 3), 0.64788354 (row 4), 6 (row 5), 4 (row 6), 1.94365063 (row 7), 3.77777778 (row 8), -0.6345156 (row 9), 0.41775758 (row 10), 6 (row 11), 3 (row 12), 9 (row 13), 50 (row 14), 9 (row 15), and 1.49402213 (row 16). The row containing 'Confidence Level(95.0%)' is highlighted with a thick black border. The row numbers 1 through 18 are visible on the left side of the spreadsheet.

|    | A                       | B          | C |
|----|-------------------------|------------|---|
| 1  | Column1                 |            |   |
| 2  |                         |            |   |
| 3  | Mean                    | 5.55555556 |   |
| 4  | Standard Error          | 0.64788354 |   |
| 5  | Median                  | 6          |   |
| 6  | Mode                    | 4          |   |
| 7  | Standard Deviation      | 1.94365063 |   |
| 8  | Sample Variance         | 3.77777778 |   |
| 9  | Kurtosis                | -0.6345156 |   |
| 10 | Skewness                | 0.41775758 |   |
| 11 | Range                   | 6          |   |
| 12 | Minimum                 | 3          |   |
| 13 | Maximum                 | 9          |   |
| 14 | Sum                     | 50         |   |
| 15 | Count                   | 9          |   |
| 16 | Confidence Level(95.0%) | 1.49402213 |   |
| 17 |                         |            |   |
| 18 |                         |            |   |