Excel is pretty clumsy for data analysis, but it's often available when other tools are not, even for professional researchers, so let's have at it.

Formulas in excel: Every cell can have a value typed into it, or it can calculate a value from a single equation or an equation that uses the values of other cells, usually, but not necessarily, defined by position relative to that cell with the equation. Let's start with the simplest example, making a list of numbers, like the numbers of samaras measured.

In column A of a new workbook, type "Samara" [my quotes, don't type the quotation marks] in cell A1 (note that columns are located by letters and rows are identified by numbers). Now in the cell below that one type "1". Now the fun begins. In the cell below that, type "=1+" and then click on the cell above it with the number 1, and press return. In that cell will appear the number '2', but if you click on the cell you will see in the formula bar the formula "=1+A2", and if you copy and paste that cell down to row 21, the numbers 1-20, and if you click on any of those cells, the formula will appear with a relative reference to cell above it, eg in cell A13 there will be the number 12 and the formula "=1+A12" . So the "=" sign to start a cell is an important signal to Excel that a formula will follow to calculate a value, rather than a typed value occupying that cell.

For a couple more simple formulas, enter the lengths for each samara measured by one person in your group, and by a second person in your group. It's important that the samaras be numbered with a sharpie so that each row contains two measures of the same samara. Now, use formulas to calculate the difference between each measurement, and the average of each pair of measurements.

Histograms in excel: OK, now that we've done one of the simpler excel features, let's move on to something so advanced, they don't even let you do it without asking. A histogram is a graph of the distribution of a single continuous variable, where the x-axis are bins containing ranges of values the variable can take, and the y-axis is either the proportion or the frequency of values falling within each bin. To make histograms you first have to activate the "Analysis ToolPak", because why would anyone want to use excel to analyze things? Turning on Analysis ToolPak is slightly different in different versions but in this Mac version on the laptops you select Tools\Excel Add-ins… and then in the dialogue box make sure that the checkbox next to Analysis ToolPak is selected. Is it? Great.
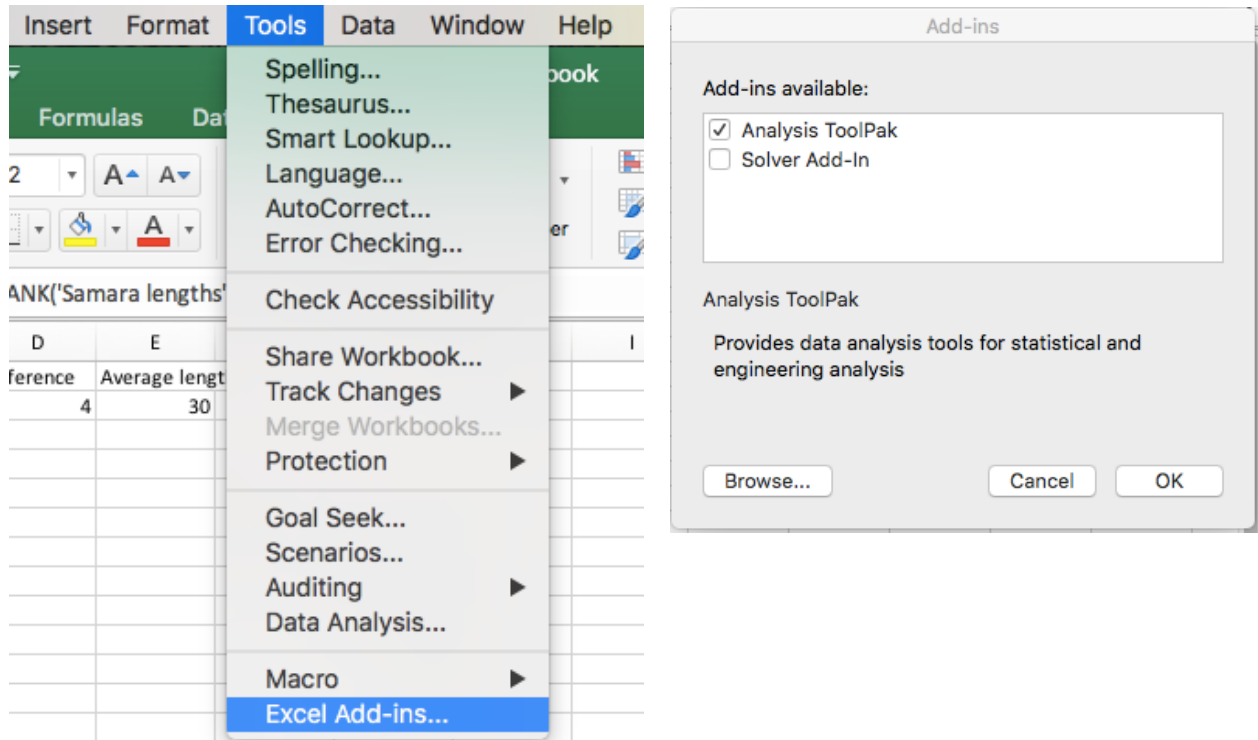
To make a histogram you need a range of values that your variable has taken, and a range of bins – the lower value of each histogram bin range. In the sample spreadsheet I just populated a bunch of lengths in mm for samaras, the column '1rst length' in worksheet samara lengths. I then made a column called 'Bins' with 5-mm bins that span the range of measurements. OK, now go back to the 'Tools' menu, and you can select 'Data Analysis…' and scroll down to 'Histogram'
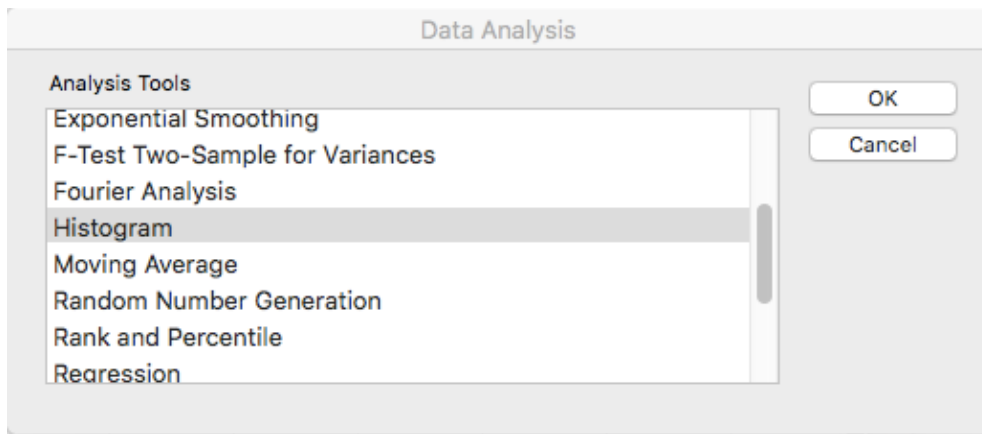
When you select Histogram a new dialogue box will open and you specify the input range, the bin range, let it create a new worksheet which will hold the histogram, and check the 'Chart Output' option. It looks like this for the sample worksheet;
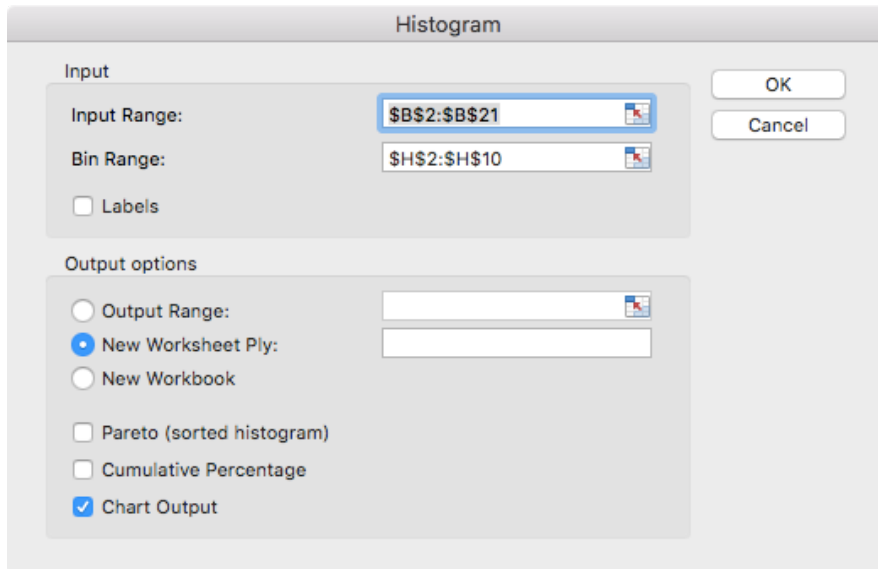
In a few seconds, a new worksheet will appear in the workbook with a super dull histogram. You can change the labels '**Histogram**' and '**Bins**' to something like '**Samara lengths**' and '**Length**' . You can now use the histogram command to show the distributions of any variable you measure or a ratio of more than one variable.

Regression in Excel:
There are two good ways of generating a linear regression. In the sample workbook I inserted a sheet called "Milkweed" populated with heights in cm and distances travelled in cm before making contact with the lab table top to use as a practice dataset.
1) As with the histogram you select Analysis tools, then select the X- and Y- ranges, and make sure to check the 'Line fit points' checkbox. This will open a new worksheet with the regression statistics and also a plot of the data and the predicted values from the regression. It's not really the best way to do regression, but it's better for viewing the summary statistics, and it's more flexible in terms of defining the ranges for x and y.
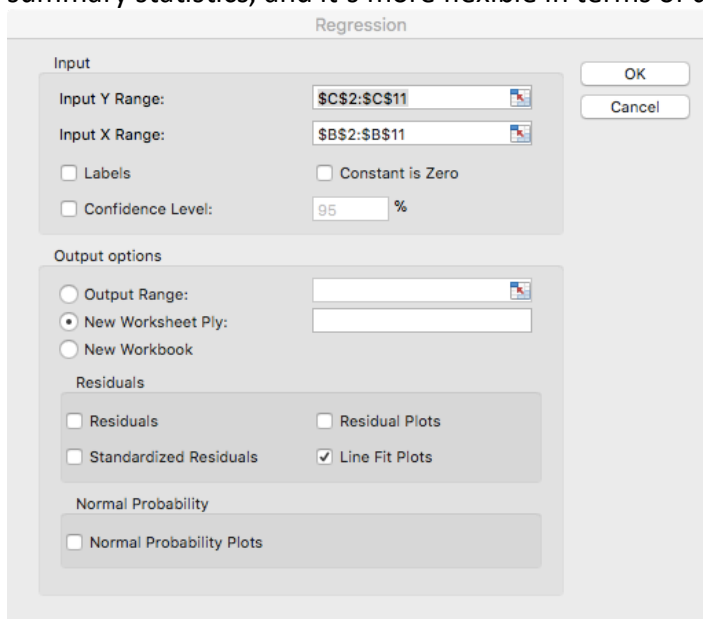
2) An easier way requires that the data are arranged as in the sample workbook, with the X column followed by the y column. Select the range of x and y values, and then click Insert\Chart\X Y (Scatter). A chart without a regression line will appear, but if you immediately click
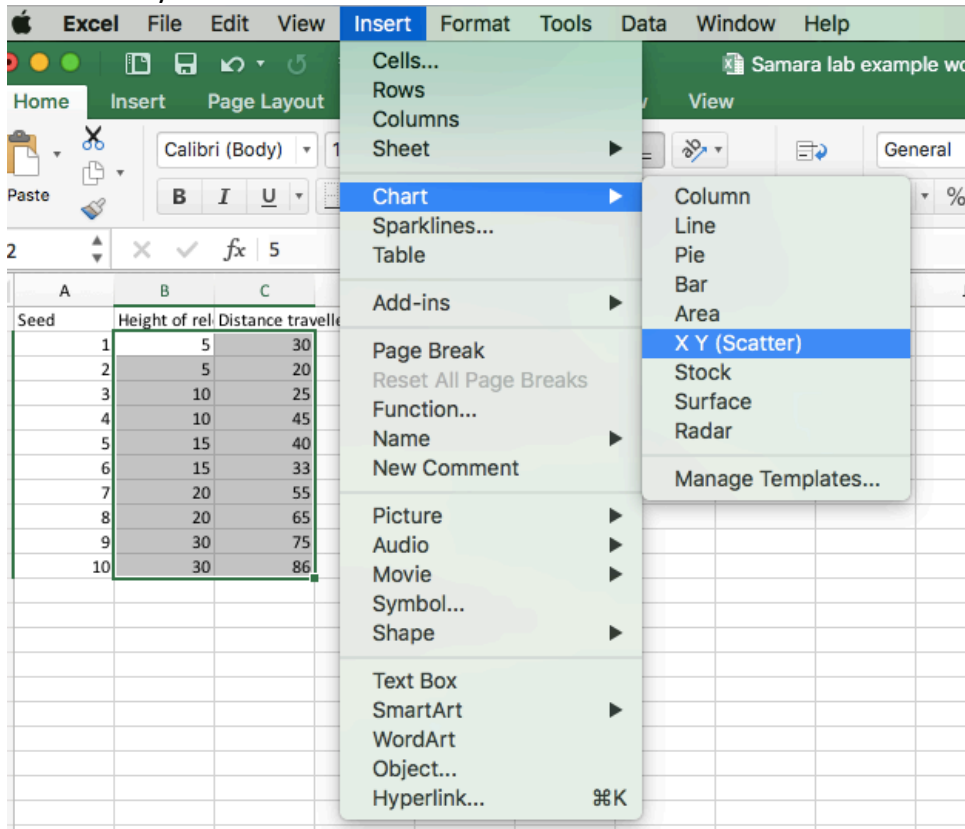
the 'Add Chart Element' button to add a linear trendline. Finally, you double click on the trendline in the chart, and select 'Display Equation on chart' and 'Display R-squared value on chart' . You're on your way! The downside of this method is that it doesn't display a significance test (P-value) for the regression, for that you need the previous.