Drawing scatter plots and trend lines using software

Relating to page 11 of *Level 3 Bivariate Data Learning Workbook*

Drawing a scatter plot on iNZight

The statistical tool iNZight will draw a scatter plot, fit a trend line and give you the equation and the correlation coefficient (*r*).

Data sets can be readily imported provided they are in the correct format:

- the file extension must be .csv (comma separated values)
- no commas, spaces or missing values in data or data headings
- file contains only data – remove any extra information such as data source, units, etc.
- data headings must be in the first row for the appropriate column, with no brackets
- all data is on one sheet, with any other sheets blank.

Example

Import the data file:

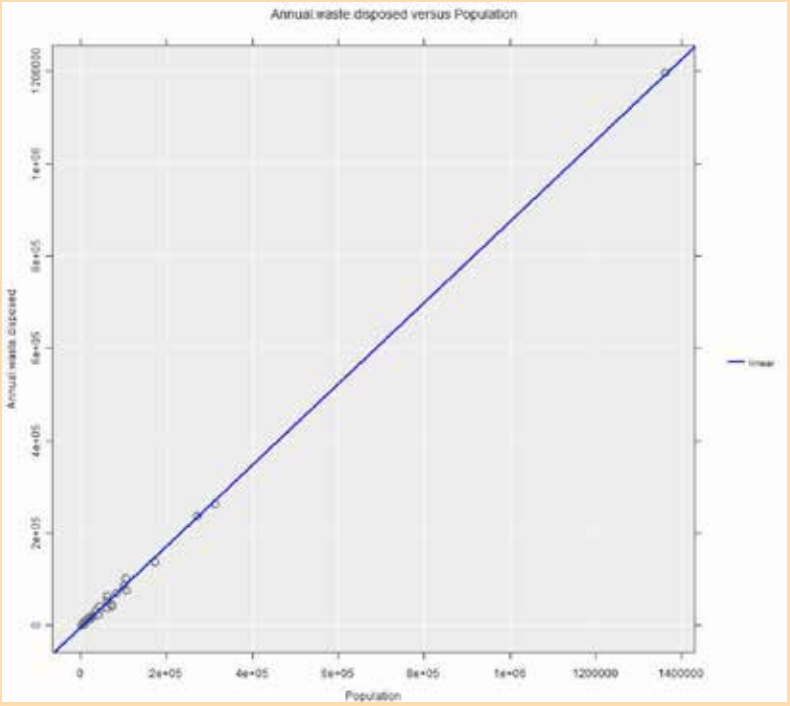
Oregon waste disposal.csv RESOURCES www.esa.co.nz/pages/esa-online

Creating the scatter graph

- Click on **View Variables**
- Click on **Population** and drag to **select/drag-drop** for Variable 2 (this means that 'Population' will be on the horizontal axis in the scatter plot). Alternatively select Population from the drop-down menu.
- Click on **Annual waste disposed** and drag to **Select/Drag-drop** for Variable 1 (this means that 'Annual waste disposed' will be on the vertical axis in the scatter plot). Alternatively, select Annual.waste.disposed from the drop-down menu.

Adding a line of best fit

- Click on  symbol (**Add to plot**) at the bottom right of the screen
- Choose **Trend Lines and Curves** in the drop-down menu beside **Add to plot**
- Tick box beside **Linear**



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Finding the equation of the line and *r*

- Click on **Home** at the bottom of the screen
- Click on **Get Summary**

Your screen should now show:

```
Linear trend:

    Disposed = -4764 + 0.8784 * Population
    Linear correlation: 1
```

This means that the annual waste disposed in Oregon in 1998 can be estimated by multiplying the population by 0.8784 and subtracting 4764.

The correlation coefficient *r* is 1, meaning there is a perfect correlation between the two variables.

Drawing a scatter plot on NZGrapher

The following instructions are used to produce a scatter graph for Annual solid waste disposal in settlements in Oregon, 1998.

First upload your file of data.
(The data for this file is available on the ESA website RESOURCES www.esa.co.nz/pages/esa-online.)

In the area above the spreadsheet:

select **Choose File** and

upload **Oregon waste disposal.csv**

In the area below the table, select your graph type and variables:

in **Graph Type** box select **Scatter graph** from the drop-down menu

in **Variable 1** box select **Population** from the drop-down menu

in **Variable 2** box Select **Disposed** from the drop-down menu.

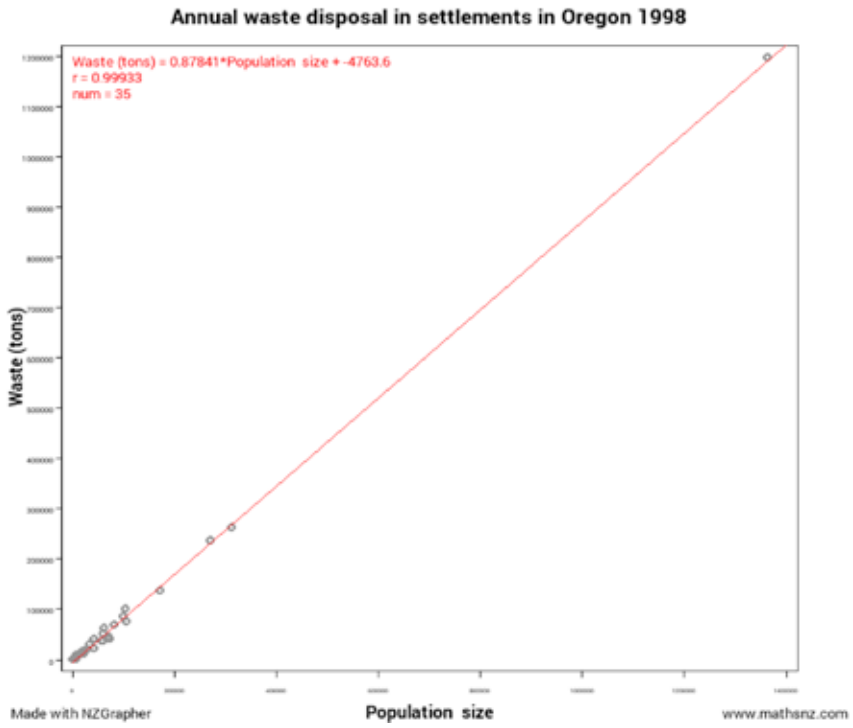
This produces a scatter graph.

Next add a trend line and equation. In the area below the graph:

select **Regression line**

adjust labels for **title** and **axes** as desired and press **Update Graph**

Right click on graph to copy.



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Drawing a scatter plot on Excel 2016

The following example illustrates the process of using the spreadsheet Excel to create a labelled scatter graph, fit a trend line and calculate an R^2-value.

Open the file **Oregon waste disposal**.
(The data for this file is available on the ESA website RESOURCES www.esa.co.nz)

Creating the scatter graph

- Using the mouse, highlight the cells A2, B2–A36, B36.
- Click **Insert**, **Scatter** and then select the scatter plot with unconnected points (top left option).

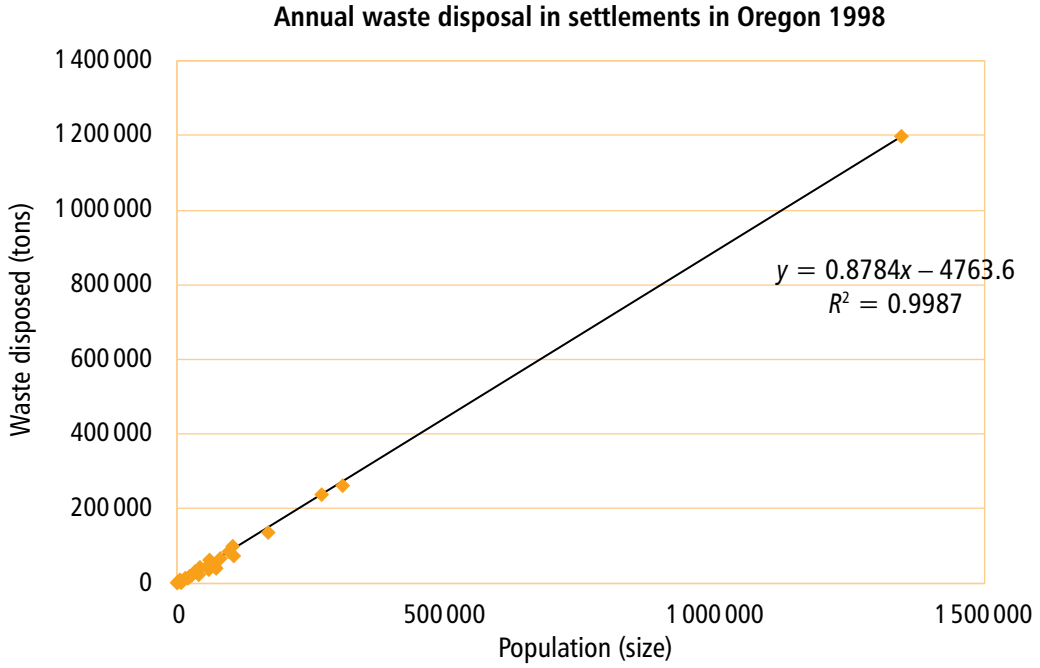
Adding labels for the axes and a title

- Select scatter graph (click anywhere on graph), then click on **Page Layout**.
- Click on **Chart Title** and select placement; then type 'Annual waste disposed in settlements in Oregon 1998' and press enter.
- Click on **Add Chart Element**, then **Axis Titles**, select vertical axis title and placement, then type 'Waste disposed (tons)'.
- Click on **Add Chart Element**, then **Axis Titles**, select horizontal axis title and placement, then type 'Population (people)'.

Adding a line of best fit

- Select graph (or right-click on any point), then click on **Add Chart Element** then **Trendline** then **More Trendline Options**.
- Select **Linear**, **Display equation on chart** and **Display R-squared value on chart**, then **Close**.

Note: You can move the equation and R^2 value by clicking on them and dragging them to the side of the graph.



On your scatter graph you should have a line passing through the points, its equation ($y = 0.8784x - 4763.6$) and the coefficient of determination value $R^2 = 0.9987$.

The correlation coefficient $r = +0.9993$ (line slopes up so take the *positive* square root of R^2-value).

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