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Exploring Scatterplots

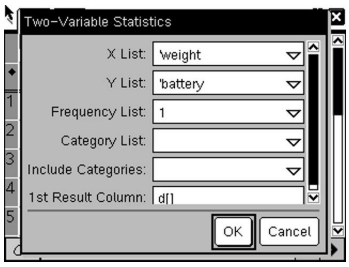
Netbooks, a smaller alternative to laptop computers, are very popular because of their portability and relatively low cost. They are also popular because their batteries tend to last longer than batteries in laptops. Consumer Reports did a study of 22 netbooks in their February 2010 edition. Among the variables they measured were battery life (hours), weight (pounds), and cost. The data appear in the table below. One question we would like to explore in this activity: **"How is battery life associated with the weight of the netbook?"**

Weight (pounds)	Battery Life (hours)
2.8	6.00
2.9	7.75
2.8	7.25
2.4	5.50
2.9	8.25
2.9	9.50
2.9	7.75
2.7	7.75
2.8	8.00
2.8	7.00
3.2	6.50

Weight (pounds)	Battery Life (hours)
2.7	6.25
2.9	5.25
2.7	5.00
2.6	3.75
2.8	4.50
2.4	2.75
2.4	2.75
2.6	2.50
2.5	2.50
2.5	2.00
2.5	2.75

1. Insert a *New Document*→ Press ctrl N.
2. Insert a *Lists & Spreadsheet* page by arrowing down to *Add Lists & Spreadsheet*.
3. Enter the data, labeling column A: **weight** for the length of battery life and column B: **battery** for the weights of the netbooks.
4. Insert a Data & Statistics page → Press ctrl I → arrow down to *Add Data & Statistics.*
5. Press tab and *Click to Add Variable* should appear on the horizontal axis. Press the down arrow and select **weight**. Then press tab and *Click to Add Variable* should appear on the vertical axis. Press the down arrow and select **battery**. This will create a scatterplot of weights in pounds vs. battery life in hours of the netbooks.

Describe the scatterplot of *battery* vs. *weight*.



6. Calculate the summary statistics for both of these variables and list them below. Go to the spreadsheet page and press menu→ *Statistics* → *Stat Calculations* → *Two-Variable Statistics*. Fill in **weight** for the x-list and **battery** for the y-list. Press tab until OK is highlighted and Press ⏎.

List the following values:

$\bar{x} =$ $s_x =$ $\bar{y} =$ $s_y =$ $r =$

What does *r* indicate about the relationship of battery life and weight?

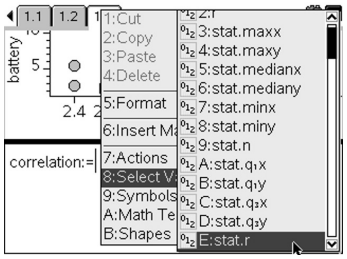
There are two points that lie "outside" the group of points: (3.2, 6.5) and (2.4, 5.5)
Let's explore what happens to the correlation if these points were closer to the group.

7. Press (ctrl) ▶ to the scatterplot. Press (doc▾) (or (ctrl)(⌂) for clickpad) and arrow down to *Page Layout* → *Select Layout* → *Layout 3*, (enter).

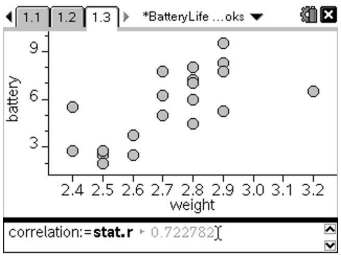
8. Press (ctrl)(tab) for the bottom screen and *Press Menu* ((menu)). Select *Add Notes*.

9. On the *Notes* page, type **correlation** (ctrl)[:=] (or (:)(=) for clickpad) and press (ctrl)(menu). Arrow to *Select Variable* → *stat.r*. (Note: stat.r may NOT be option E for your screen) Press (enter).

   The value of ***r*** should now be displayed.



To get a better view of the scatterplot, you can resize the lower screen. Press (doc▾) (or (ctrl)(⌂)) and arrow down to *Page Layout*. Select *Custom Split* and press (enter). On the line between the screens you should now see the message [Use + or − to choose a layout] and ⊙. Press the down arrow and the bottom screen should resize. When you resize the layout, it should look like the screen to the right.



10. Press (ctrl)(tab) to go to the scatterplot. Arrow over the point that is the furthest to the right. The pointer (↖) should change to an open hand (✋). Press and hold [✋] and the ✋ will become ✋.

11. Using the Touchpad, move the point up until the coordinate is approximately (3.2, 9.7).

Describe what happens to the correlation as the point moves closer to (3.2, 9.7) coordinates. Be specific.

What would this suggest about this netbook that weighed 3.2 pounds? Explain.

12. Press ctrl esc to return the point to its previous place on the graph. To “deselect” the point, press somewhere in an open area of the scatterplot.

13. Following the instructions from #10, arrow over to the coordinate (2.4, 5.5). Move this point down until it is approximately (2.4, 2.5).

How does moving this point affect the correlation?

What would this suggest about this 2.4 pound netbook compared to others of similar weight?

14. Press ctrl esc to return this point to its previous place on the graph and then “deselect” it.

15. Following the instructions from #10, arrow over to one of the coordinates around the “middle” of the scatterplot. Move this point up and down and make a mental note of what happens to the correlation.

16. Press ctrl esc to return this point to its previous place on the graph and then “deselect” it.

17. Repeat 15 and 16 for several more points.

Make a comparison of how the adjustments of the points affected the correlation. Be specific.

Which points increased the correlation? By how much did the correlation increase?

Which points decreased the correlation? By how much did the correlation decrease?

Which points had the greatest effect on the correlation? Describe these points in context of the data set.

Summarize what you have learned about the effect of a single point on the correlation.

Write a few sentences about the relationship of weight on battery life.

Save this document as **Netbook**. We will be using it again for regression activities.