

SPINOFF 9C

Scatterplots and Regression Lines with the TI-92™

Is the length of time required in the OPF related to the mission in days? You will answer this question by doing the following exercises. Use the information in Table 9C located on the last page of this Spinoff to complete the exercises.

Exercise 1: Follow the steps below to draw a scatterplot with the mission duration on the x-axis and the time spent in the OPF on the y-axis. Is there a pattern to the points? Describe any pattern you observe.

Preliminaries:

The keys that you will press are in boldface.

- In sequence, Press **ON**, the **green diamond** key, and **HOME** (the Q key) to assure that you start with the home screen.
- Press **MODE**. On the first line (Graph), a blinking cursor will highlight a word. Press the right side of the blue **cursor pad** (thumb button) to see the choices. Select “1:FUNCTION” by highlighting it and pressing **ENTER** or by pressing **1**.
- Press the bottom of the blue **cursor pad** to move down in the menu until you reach “AUTO”, “EXACT” or “APPROXIMATE”. Push the right side of the blue **cursor pad** to see three choices. Select “Approximate”, and hit **ENTER** twice to get back to the home screen.
- Now we'll clear out any functions or plots that may be entered in the Y= editor. Press the **green diamond** key followed by **Y=** (the W key). If there are any functions entered, select them and press **CLEAR** to remove them from memory. Use the blue **cursor pad** to move up on the screen to check for plots. If there are any plots, highlight them and press **CLEAR**.

Entering the Data:

- Press **APPS** to access applications. Move cursor to Data/Matrix Editor, press the right side of the blue **cursor pad** to see choices, highlight “NEW”, and press **ENTER**.
- The cursor will be on the first line of the “NEW” menu. Press the right side of the blue **cursor pad** to see the choices. Select “Data” by highlighting it and pressing **ENTER** or by pressing **1**.
- Move the cursor down to the “Variable:” box, type in OPF1, and hit **ENTER**. This names the data file for future access. Press **ENTER** again, and a data table pops up with your cursor at row 1, column 1.

Now enter the data from Table 9C into the TI-92's™ data table. Enter the duration times (x values) in column c1 and the time spent in the OPF (y values) in column c2. After typing in a value of the data, press **ENTER**. Continue this process until you've entered all 150 entries from Table 9C. You may use the blue cursor pad to navigate anywhere in the data table. If you enter a wrong number, you can correct the error by using the CLEAR key. (One person may enter all the data and then share it with others using the TI-92™ cable and link feature!)

Please note that if you mistakenly exit the data table, you can retrieve it by hitting the **2nd** key followed by **ESC** (QUIT). This takes you to the home screen. At this point you may hit the **APPS** key, select “Data/matrix Editor” and now “Current”. This will take you back into editor mode in the data table.

Making a Scatterplot:

Press **F2** for plot setup when your data table is on the screen. Press **F1** to obtain plot choices. Press the right side of the blue **cursor pad** to see 4 choices. Highlight “1:Scatter” and hit **ENTER**. Move the cursor down to the x-line and type c1. Then move the cursor down to the y-line, type c2, and press **ENTER** twice.

Next to Plot 1 you should see the scatterplot icon and the variable names for the datafile. If not, then you should return to the data table and set up the scatterplot again.

To produce the scatterplot, press the **green diamond key** followed by **GRAPH** (the R key). Press **F2** and then press **9** to select “9:ZoomData”. (This changes the axes to fit the data values.) You should now see the scatterplot.

Exercise 2: Determine the linear regression line and correlation coefficient. What information does the correlation coefficient tell you about the relationship between the mission duration and the time spent in the OPF? Follow the steps below to find the regression line with your TI-92™.

In Exercise 1, you carried out the preliminaries for doing statistics calculations, and you entered the data. You will now continue with the work you did for Exercise 1 and find the linear regression equation for the data.

Finding the Linear Regression Equation:

Return to the data table by pressing **APPS**, **6**, and **1**. Press **F5** when your data table is on the screen. The calculator will show you “TwoVar”. Press the right side of the blue **cursor pad** to see your other choices. Select “5:LinReg” and hit **ENTER**.

Press the bottom of the **cursor pad** to move the cursor down to the x-line, and type c1. Move the cursor to the y-line, and type c2. Press the bottom of the **cursor pad** to highlight the word “none”. Press the right side of the **cursor pad** to choose a function so that you can save the regression equation. Highlight y1(x) and press **ENTER**. Press **ENTER** a second time to display the linear regression statistics.

The regression equation, correlation coefficient, and the square of the regression coefficient should now appear on the screen. The regression equation is also stored in the y= editor as y1(x).

Exercise 3: Graph the linear regression equation on your scatterplot. Does there seem to be a good fit between the line and the points on the scatterplot?

We are now ready to produce a graph of the regression equation and scatterplot together.

Regression Line and Scatterplot on Same Screen:

Press the **green diamond key** followed by **Y=** (the W key). Both Plot 1 and y1(x) will have a check mark by them. (The check mark indicates that the item will be graphed. It can be turned on and off with F4.)

Press the **green diamond key** followed by **GRAPH** (the R key). Notice that the graph appears immediately since we have already set up the axes for the scatterplot in Exercise 1.

You should now see the scatterplot and regression line together on the same screen.

Table 9C

Flight #	Mission Duration (days)	Time Spent in OPF (days)	Flight #	Mission Duration (days)	Time Spent in OPF (days)	Flight #	Mission Duration (days)	Time Spent in OPF (days)
1	54.4	613	26	97	263	51	236.9	73
2	54.2	103	27	105.1	243	52	175.3	251
3	192.1	68	28	119.7	100	53	143.6	63
4	169.2	41	29	97.0	87	54	222.1	74
5	122.2	55	30	121.0	162	55	239.7	93
6	122.2	139	31	119.7	97	56	239.8	63
7	146.4	34	32	120.1	86	57	236.2	61
8	145.2	27	33	261.0	88	58	336.2	89
9	247.8	98	34	106.3	83	59	260.0	111
10	191.3	117	35	121.3	90	60	199.2	105
11	167.7	32	36	98.2	111	61	335.3	86
12	144.9	147	37	117.9	147	62	269.8	91
13	197.4	143	38	215.1	127	63	353.9	82
14	191.8	38	39	143.6	108	64	262.8	166
15	73.6	36	40	199.4	163	65	269.8	79
16	167.9	55	41	218.2	428	66	262.6	126
17	168.2	147	42	213.4	61	67	198.5	99
18	169.7	40	43	128.5	80	68	399.2	108
19	190.8	45	44	166.9	68	69	235.4	148
20	170.3	31	45	193.3	76	70	214.3	80
21	97.8	78	46	214.2	76	71	260.5	92
22	168.8	62	47	213.3	221	72	381.9	121
23	165.1	27	48	331.5	109	73	196.5	86
24	146.1	109	49	191.3	63	74	214.0	103
25	0.017	36	50	190.3	78	75	377.7	89