

# **Sharp EL-9900 Graphing Calculator**

## **Basic Keyboard Activities**

General Mathematics

Algebra

Programming

## **Advanced Keyboard Activities**

Algebra

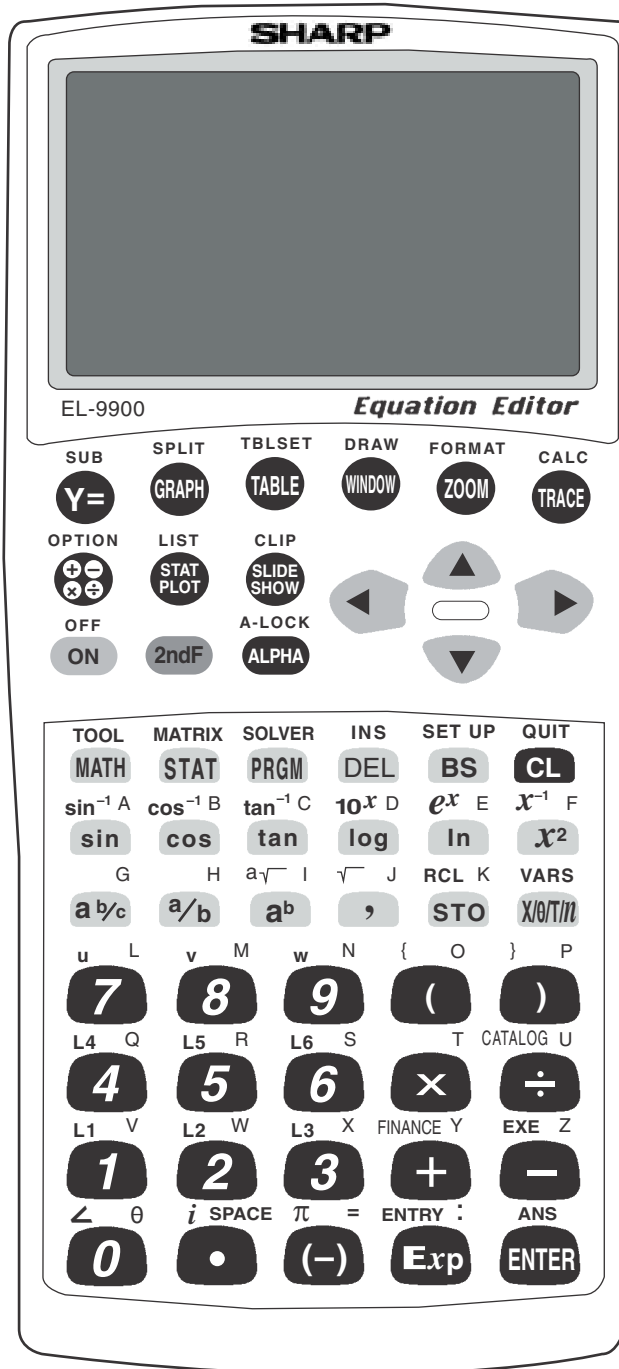
Calculus

Statistics

Trigonometry

Programming

# Sharp EL-9900 Graphing Calculator Advanced Keypad



# CREATION OF A ONE-VARIABLE DATA SET

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## Steps for creating a non-weighted one-variable data set

1. Turn the calculator on and press **STAT** to enter the statistics menu.
2. Touch **A (EDIT)** **ENTER**, to view the statistics data entry screen.  
If there is a data set present within the lists on your calculator, use the arrow keys to move to the list, if necessary, and press **▲** to highlight the list label.
3. Press **DEL** **ENTER** to delete the old data. Repeat for other lists of data.
4. Move the highlighter to the cell directly below the L1 in the table. Enter the following data set:  
5      8      7      6      8      9      3      5  
by pressing **5** **ENTER** **8** **ENTER** **7** **ENTER** **6** **ENTER** **8** **ENTER**  
**9** **ENTER** **3** **ENTER** **5** **ENTER**.
5. To check the data you have entered, press **▲** to move back through the data values.
6. To sort your data set in an ascending manner, press **⊕** **⊖** **STAT** **B (OPE)** **1** **(sortA)** **2ndF** **L1** **)** **ENTER**. Press **STAT** **A (EDIT)** **ENTER**. Notice this first cell now contains the smallest value 3.
7. To save this data set, press **⊕** **⊖** **2ndF** **LIST** **C (L\_DATA)** **1 (StoLD)** **1** **ENTER**. You can store up to ten sets of six lists.
8. To retrieve a data set matrix into a statistical data set, press **⊕** **⊖** **2ndF** **LIST** **C (L\_DATA)** **2 (RcILD)** **1** **ENTER**.

# CREATION OF A ONE-VARIABLE DATA SET

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## Steps for creating a weighted one-variable data set

1. Turn the calculator on and press **STAT** to enter the statistics menu.
2. Press **A** (**EDIT**) **ENTER**, to view the statistics data entry screen.  
Remove old data by using the arrow keys to move to the list of data, and press **▲** to highlight the list label. Press **DEL** **ENTER** to delete the old data. Repeat for other lists of data.
3. Move the highlighter to the cell directly below the L1 in the table. Enter the following data set into L1 with the frequencies entered into L2. If a value appears three times within a data set, its weight or frequency is 3. Enter the following data set using the weights:

5 5 5 7 7 7 7 8 9 9  
 by pressing **5** **ENTER** **7** **ENTER** **8** **ENTER** **9** **ENTER** **▶** **3**  
**ENTER** **4** **ENTER** **1** **ENTER** **2** **ENTER**.

No	1: L1	2: L2	3: L3
1	5	3	-----
2	7	4	
3	8	1	
4	9	2	
5	-----	-----	
6			

4. To save this data set, press **⊕** **⊖** **2ndF** **LIST** **C** (**L\_DATA**)  
**1** (**StoLD**) **2** **ENTER**.

# NUMERICAL DESCRIPTION OF A ONE-VARIABLE DATA SET

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## Steps for calculating numerical descriptions of a one-variable non-weighted data set

1. Turn the calculator on and press **STAT** to enter the statistics menu.  
Press **A** (**EDIT**) **ENTER** to view the statistics data entry screen.  
If there is a data set present within the lists on your calculator, use the arrow keys to move to the list, if necessary, and press **▲** to highlight the list label. Press **DEL** **ENTER** to delete the old data. Repeat for other lists of data.
2. Move the highlighter to the cell directly below the L1 in the table.  
Enter the following data set:  
25 32 28 33 31 27 40 38 29 30
3. Check the data you have entered and correct any errors you may find.  
Press **2ndF** **QUIT** to exit the data entry screen. To calculate the numerical descriptions of the data set, press **STAT** **C** (**CALC**) and **1** (**1\_Stats**).  
Press **ENTER** and the statistical results will appear.
4. The statistics displayed are:
  1. the average or mean value of the data set,  $\bar{x}$ ;
  2. the standard deviation assuming the data set is a sample from a population,  $s_x$ ;
  3. the standard deviation assuming the data set represents the entire population,  $\sigma_x$ ;
  4. the sum of the data values,  $\Sigma x$ ;
  5. the sum of the squared data values,  $\Sigma x^2$ ;Press **▼** five times to see more of the statistics.
  6. the number of values in the data set,  $n$ ;
  7. the minimum value in the data set,  $x_{\min}$ ;
  8. the first quartile (25th percentile),  $Q_1$ ;
  9. the median (50th percentile),  $Med$ ;
  10. the third quartile (75th percentile),  $Q_3$ ; andPress **▼** one more time to see the final statistic.
  11. the maximum value in the data set,  $x_{\max}$ .

# HISTOGRAM REPRESENTATION OF A ONE-VARIABLE DATA SET

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## Steps for creating a non-weighted data set's histogram

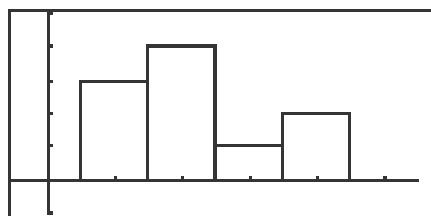
1. Turn the calculator on, press **STAT** **A** (**EDIT**) **ENTER** to view the statistics data entry screen. Delete old data sets.
2. Move the highlighter to the cell directly below the L1 in the table and enter the following data set:  
15 28 17 36 38 19 13 25 27 41
3. Check the data you have entered by pressing **▲** to move back through the data.
4. To graph a histogram that represents the data set, you must first press **STAT PLOT** **A** (**PLOT1**) and press **ENTER**. A PLOT1 setup screen will appear. Turn the plot on by pressing **ENTER**. Select one-variable data by pressing **▼** **ENTER**. Set the list to L1 by pressing **▼** **2ndF** **L1** **ENTER**. A blank Freq: prompt indicates the data is non-weighted and the frequencies are one. Choose the histogram graph by pressing **▼** **STAT PLOT** **A** (**HIST**) and **1** (**Hist**).
5. Set the calculator to rectangular graphing by pressing **2ndF** **SET UP** **E** (**COORD**) **1** (**Rect**) and press **2ndF** **QUIT**.
6. Set the viewing window by pressing **WINDOW**. Set the horizontal axis to  $10 < x < 50$  with Xscl = 10 by pressing **1** **0** **ENTER** **5** **0** **ENTER** **1** **0** **ENTER**. Set the vertical axis to  $0 < y < 5$  with Yscl = 1 by pressing **0** **ENTER** **5** **ENTER** **1** **ENTER**.
7. To view the histogram, press **GRAPH**.

# HISTOGRAM REPRESENTATION OF A ONE-VARIABLE DATA SET

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## Steps for creating a weighted data set's histogram

1. Press **STAT** **A** (**EDIT**) **ENTER** to view the statistics data entry screen. Delete old data sets.
2. Move the highlighter to the cell directly below the L1 in the table and enter the following data set using weights:  
1 1 1 2 2 2 2 3 4 4  
by pressing **1** **ENTER** **2** **ENTER** **3** **ENTER** **4** **ENTER** **▶** **3** **ENTER** **4** **ENTER** **1** **ENTER** **2** **ENTER**.
3. Press **STAT PLOT** **A** (**PLOT1**) **ENTER** and a PLOT1 setup screen will appear. Turn the plot on by pressing **ENTER**. Select one-variable data by pressing **▼** **ENTER**. Set the list to L1 by pressing **▼** **2ndF** **L1** **ENTER**. Set the frequencies to L2 by pressing **2ndF** **L2** **ENTER**. Choose the histogram graph by pressing **STAT PLOT** **A** (**HIST**) and **1** (**Hist**).
4. To set this viewing window, press **WINDOW** and set the horizontal axis to  $-0.5 < x < 5.5$  with Xscl = 1 by pressing **(-)** **◻** **5** **ENTER** **5** **◻** **5** **ENTER** **1** **ENTER**. Next, set the vertical axis to  $-1 < y < 5$  with Yscl = 1 by pressing **(-)** **1** **ENTER** **5** **ENTER** **1** **ENTER**.
5. Press **Y=** and **CL** to clear any graphs. Press **GRAPH** view the histogram.



# OTHER GRAPHICAL PORTRAYALS OF A ONE-VARIABLE DATA SET

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## Steps for creating a non-weighted data set's broken-line graph

1. Turn the calculator on and press **STAT** to enter the statistics menu.  
Delete old data and enter the following data set for L1:  
15 28 17 36 38 19 13 25 27 41
2. Check the data you have entered by pressing **▲** to move back through the data.
3. To graph a broken-line graph for the data set, first press **STAT PLOT** **A** (**PLOT1**) **ENTER**. Turn PLOT1 on by pressing **ENTER**.  
Press **▼** **ENTER** to choose one-variable data. Press **▼** **2ndF** **L1** **ENTER** to enter L1 as the data list. Clear the frequency prompt by pressing **▶** **DEL** **ENTER**. Set the graph to a broken line graph by pressing **STAT PLOT** **B** (**B.L.**) **3** (**Broken**).
4. In our example, the smallest value is 13 and the largest value is 41. The logical intervals for the data set would be 10-19 (tens), 20-29 (twenties), 30-39 (thirties), and 40-49 (forties). To set this viewing window, press **WINDOW** and set the horizontal axis to  $10 < x < 50$  with Xscl = 10. Set the vertical axis to  $0 < y < 5$  with Yscl = 1.
5. To view the graph, press **GRAPH**.
6. Press **TRACE** and then press **▶** repeatedly to trace the points making up the broken-line graph.
7. Turn PLOT1 off by pressing **STAT PLOT** **ENTER** **▶** **ENTER** **2ndF** **QUIT**.

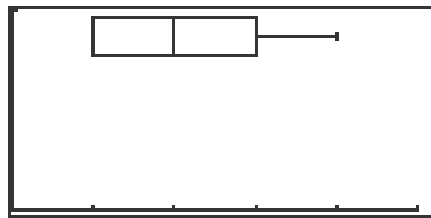


# OTHER GRAPHICAL PORTRAYALS OF A ONE-VARIABLE DATA SET

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## Steps for creating a weighted data set's box-and-whisker chart

1. Press **STAT** to enter the statistics menu. Delete old data and enter the following data set in L1 using weights in L2:  
1 1 1 2 2 2 2 3 4 4
2. To construct a box-and-whisker chart, first press **STAT PLOT** **A** **ENTER**. Press **ENTER** to turn PLOT1 on. Press **▼** **ENTER** to choose one-variable data. Press **▼** **2ndF** **L1** **ENTER** to enter L1 as the data list. Set the frequency prompt to L2 by pressing **2ndF** **L2** **ENTER**. Set the graph to a box-and-whisker chart by pressing **STAT PLOT** **E** **(BOX)** **1** **Box**.
3. In the example, the data is discrete with a smallest value of 1 and a largest value of 4. Set the viewing window to  $0 < x < 5$  with  $Xscl = 1$ . Next, set the vertical axis to  $0 < y < 1$  with  $Yscl = 1$ .
4. To view the box-and-whisker chart for the data, press **GRAPH**.



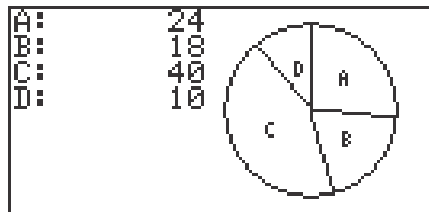
5. Press **TRACE** followed by **◀** and **▶** to view the five values making up the box-and whisker chart.
6. Turn PLOT1 off by pressing **STAT PLOT** **ENTER** **▶** **ENTER** **2ndF** **QUIT**.

# OTHER GRAPHICAL PORTRAYALS OF A ONE-VARIABLE DATA SET

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## Steps for creating a pie chart from count data

1. Press **STAT** to enter the statistics menu. Delete old data and enter the following data set in L1 using weights in L2:  
24   18   40   10
2. To construct a pie chart, first press **STAT PLOT** **ENTER** . Press **ENTER** to turn PLOT1 on. Press **▼** **ENTER** to choose one-variable data. Press **▼** **2ndF** **L1** **ENTER** to enter L1 as the data list. Leave the Freq prompt blank. Set the graph to a pie chart by pressing **STAT PLOT** **F (PIE)** **1** **(PIE)** .
3. To view the pie chart for the data, press **GRAPH** .



4. Press **TRACE** followed by **◀** and **▶** to highlight and mark the pieces of the pie.
5. Turn PLOT1 off by pressing **STAT PLOT** **ENTER** **▶** **ENTER** **2ndF** **QUIT** .

# CREATION OF A TWO-VARIABLE DATA SET

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## Steps for creating a non-weighted two-variable data set

1. Turn the calculator on and press **STAT** to enter the statistics menu. Press **A (EDIT)** **ENTER** to view the data-entry screen. If old data is present, delete it by moving the highlighter over L1 and pressing **DEL** **ENTER**. Repeat for other lists.

2. Enter the following data set with X in L1 and Y in L2:

<u>X</u>	<u>Y</u>
5	8
7	6
8	9
3	5

by moving the highlighter to the cell below the L1 header and then pressing **5** **ENTER** **7** **ENTER** **8** **ENTER** **3** **ENTER** **▶** **8** **ENTER** **6** **ENTER** **9** **ENTER** **5** **ENTER**.

3. Sometimes, you will need to sort the data in an ascending or descending manner for either the X or Y variables. To sort your data set with the X values ascending, press **2ndF** **QUIT** **STAT**, press **B (OPE)** **1 (sortA)** and press **2ndF** **L1** **,** **2ndF** **L2** **)** **ENTER**. Press **STAT** **A (EDIT)** **ENTER** to view the list. Notice the ordered pairs were rearranged with the X values ascending and their appropriate Y values.
4. Save this data set by pressing **⊕ ⊖ ⊗ ⊘** **2ndF** **LIST** **C (L\_DATA)** **1 (StoLD)** and press **1** **ENTER**.
5. To recall the statistical data from memory, press **⊕ ⊖ ⊗ ⊘** **2ndF** **LIST**, **C (L\_DATA)** **2 (RcILD)** and press **1** **ENTER**.

# CREATION OF A TWO-VARIABLE DATA SET

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## Steps for creating a weighted two-variable data set

1. Turn the calculator on and press **STAT** to enter the statistics menu. Press **A** (**EDIT**) **ENTER** to view the data-entry screen. If old data is present, delete it by moving the highlighter over L1 and pressing **DEL** **ENTER** . Repeat for other lists.
2. Each row will contain a data point (X, Y) and weight or frequency of occurrence. If a point (X,Y) appears four times within a data set, its weight or frequency is 4. Enter the following data set in L1 and L2 using L3 for the weights:

X	Y	W
5	3	7
4	8	9
2	10	3

by pressing **5** **ENTER** **4** **ENTER** **2** **ENTER** **▶** **3** **ENTER** **8**  
**ENTER** **1** **0** **ENTER** **▶** **7** **ENTER** **9** **ENTER** **3** **ENTER** .

No	1: L1	2: L2	3: L3
1	5	3	7
2	4	8	9
3	2	10	3
4	-----	-----	-----
5			
6			

3. Save this data set by pressing **⏏** **2ndF** **LIST** **C** (**L\_DATA**) **1** (**StoLD**) and press **2** **ENTER** .

# NUMERICAL DESCRIPTION OF A TWO-VARIABLE DATA SET

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## Steps for calculating numerical descriptions of a two-variable data set

1. Turn the calculator on and press **STAT** to enter the statistics menu. Press **A (EDIT)** **ENTER** to access the data entry screen. Delete old data by highlighting L1 and pressing **DEL** **ENTER**. Repeat for other lists.

Enter the following data set:

X   Y

25   32

28   33

31   27

40   38

29   30

2. Check the data you have entered and correct any errors you may find. To calculate the numerical descriptions of the two variables, press **2ndF** **QUIT** **STAT** **C (CALC)** **2** **2\_Stats**. Press **ENTER** and the statistical results will appear.
3. Press **▼** to view the remaining statistics.
4. The statistics displayed are:
  1. the average or mean value of the variable,  $\bar{x}$  or  $\bar{y}$  ;
  2. the standard deviation assuming the data points are a sample from a population,  $s_x$  or  $s_y$ ;
  3. the standard deviation assuming the data points represent the entire population,  $\sigma_x$  or  $\sigma_y$ ;
  4. the sum of the values,  $\Sigma x$  or  $\Sigma y$ ;
  5. the sum of the squared values,  $\Sigma x^2$  or  $\Sigma y^2$ ;
  6. the number of data points,  $n$ ;
  7. the minimum variable value,  $x_{\min}$  or  $y_{\min}$ ;
  8. the maximum variable value,  $x_{\max}$  or  $y_{\max}$ ; and
  9. the sum of the  $x$  and  $y$  products,  $\Sigma xy$ .

# NUMERICAL DESCRIPTION OF A TWO-VARIABLE DATA SET

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## Steps for calculating numerical descriptions of a weighted two-variable data set

1. Turn the calculator on and press **STAT** **A** **ENTER** to enter the statistics menu. Delete old data set by highlighting L1 and pressing **DEL** **ENTER** . Repeat for other lists.
2. Enter the following data set which represents the frequency of observing doubles with a particular pair of dice. The dice were rolled until fifty doubles were observed.

<u>X</u>	<u>Y</u>	<u>W</u>
1	1	8
2	2	10
3	3	12
4	4	9
5	5	6
6	6	5

Each row will contain a data pair and the frequency of occurrence.

3. Check the data you have entered. To calculate the numerical descriptions of the two variables, press **2ndF** **QUIT** **STAT** **C** (**CALC**) and **2** (**2\_Stats**). Press **2ndF** **L1** **,** **2ndF** **L2** **,** **2ndF** **L3** **ENTER** and the statistical results will appear.
4. Press **▼** to view more of the numerical descriptions.

# GRAPHICAL PORTRAYAL OF A TWO-VARIABLE DATA SET

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## Steps for drawing a scatter diagram of a two-variable data set

1. Consider the following table listing the revenue for a large corporation:

<u>Year</u>	<u>Revenue (in millions of dollars)</u>
1	48.63
2	48.86
3	48.91
4	49.69
5	51.10
6	52.00
7	52.03

2. Access the statistics data entry screen and delete old data.
3. Enter the data using L1 for the year and L2 for the revenue (in millions of dollars). Check the data and correct any errors you may find.
4. Press **STAT PLOT** **A** (**PLOT1**) **ENTER** to access the PLOT1 set up screen. To turn PLOT 1 on, press **ENTER**. Press **▼** **▶** **ENTER** to set the data to two-variable. Set L1 for the x variable by pressing **▼** **2ndF** **L1** **ENTER**. Press **2ndF** **L2** **ENTER** to set L2 for the y variable. To set the graph to scatter diagram, press **STAT PLOT** **G** (**S.D.**) and **3** (**Scattr** ).
5. Construct an autoscaled scatter diagram of this data set by pressing **ZOOM** **A** (**ZOOM**) **9** (**Stat**).
6. Press **TRACE** and press **▶** repeatedly to verify that Xmin= 1, Xmax= 7, Ymin= 48.63, and Ymax= 52.03.

# LINEAR REGRESSIONS

## Steps for calculating the best-fitting line

1. Turn the calculator on and press **STAT** to enter the statistics menu.  
Access the data entry screen by pressing **A (EDIT)** **ENTER** .

Delete old data and enter the following data set:

X Y

25 32

28 33

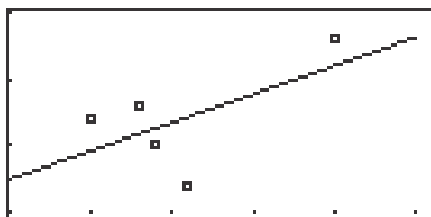
31 27

40 38

29 30

Check the data you have entered and correct any errors you may find.

2. To find the best-fitting line (regression line) for the data, press **STAT** **D (REG)** **0** **2 (Rg\_ax+b)** and press **ENTER** .
3. To overlay the regression line and the scatter diagram for the data, you must first set up the scatter diagram by pressing **STAT PLOT** **A (PLOT1)** **ENTER** **ENTER** **▼** **▶** **ENTER** **▼** **2ndF** **L1** **ENTER** **2ndF** **L2** **ENTER** **STAT PLOT** **G (S.D.)** and **3 (Scatter□)**.
4. Display the scatter diagram for the data by pressing **WINDOW** and setting Xmin = 20, Xmax = 45, Xscl = 5, Ymin = 25, Ymax = 40, and Yscl = 5. Press **GRAPH** to view the scatter diagram.
5. To view the overlay of the regression line and the scatter diagram, press **Y=** **CL** **2ndF** **VARS** **H (STAT)** **ENTER** **B (REGEQN)** **1 (RegEqn)** **GRAPH** .





# OTHER REGRESSIONS

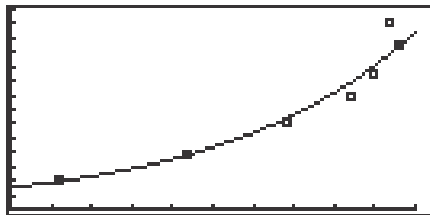
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## Steps for calculating other regression models

1. Access the data entry screen and delete old data. Enter the following data set:

<u>X</u>	<u>Y</u>
6	10
22	19
34	31
42	39
45	47
48	58
47	66

2. Check the data you have entered and correct any errors you may find.
3. Set up the scatter diagram using the STAT PLOT window
4. Display the scatter diagram for the data by pressing **WINDOW** and setting Xmin = 0, Xmax = 50, Xscl = 5, Ymin = 0, Ymax = 70, and Yscl = 5. Press **GRAPH** to view the scatter diagram.
5. To find the best-fitting exponential curve ( $Y = a \cdot e^{bx}$ ) for the data, press **2nd** **STAT** **D** **(REG)** **1** **0** **(Rg\_ae<sup>bx</sup>)** and press **ENTER**.
6. To view the overlay of the regression curve and the scatter diagram, press **Y=** **CL** **2ndF** **VARS** **H** **(STAT)** **ENTER** **B** **(REGEQN)** **1** **(RegEqn)** and press **GRAPH**.



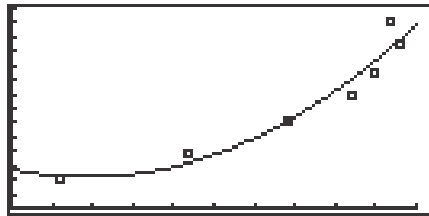
7. Repeat this process to find and view other regression models.

# OTHER REGRESSIONS (continued)

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## Steps for calculating other regression models

1. To find the best-fitting quadratic curve ( $y = ax^2 + bx + c$ ) for the data, press  $\boxed{\frac{+}{-}} \boxed{\frac{=}{\neq}} \boxed{\text{STAT}} \boxed{\text{D}} \boxed{\text{(REG)}} \boxed{0} \boxed{4} \boxed{\text{(Rg}_x^2)}$  and press  $\boxed{\text{ENTER}}$ .
2. To view the overlay of the regression curve and the scatter diagram, press  $\boxed{\text{Y=}} \boxed{\text{CL}} \boxed{2\text{ndF}} \boxed{\text{VARS}} \boxed{\text{H}} \boxed{\text{(STAT)}} \boxed{\text{ENTER}} \boxed{\text{B}} \boxed{\text{(REGEQN)}} \boxed{1} \boxed{\text{(RegEqn)}}$  and press  $\boxed{\text{GRAPH}}$ . The following overlay will be displayed.



## Model of best fit

1. Notice, the  $r^2$  value for the quadratic regression model is about .9337.
2. Whereas the  $r^2$  value for the exponential regression model was .9786.
3. The exponential regression model (with the  $r^2$  value closer to 1) is considered the better-fitting model. The exponential regression model even fits better than the linear model with an  $r^2$  value of .8553.
4. Continue this analysis with other regression models.

# STATISTICAL TESTS

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## Steps for performing a one-small-sample hypothesis test for the population mean

1. Turn the calculator on and access the data entry screen. Delete old data and enter the following data set for L1:  
7 10 7 6 8 10 15 14 11 12 6 11  
11 5 7 9 9 7 4 4 6 5 13
2. Check the data you have entered and correct any errors you may find. The data shown above reflects the number of wins for the Chicago Bears in each complete regular season since 1978.
3. Test the alternate hypothesis that "da Bears" are a winning football team against the null hypothesis that "da Bears" are a .500 ball club (8 wins).
4. Set up the statistical test by pressing **2ndF** **QUIT** **STAT** **E** (**TEST**) and **0** **3** (**Ttest1samp**).
5. Set the alternate hypothesis to  $\mu > \mu_0$  by pressing **▶** **▶** **ENTER** .  
Set the null hypothesis equal to 8 wins by pressing **▼** **8** **ENTER** .  
Set the List to L1 by pressing **2ndF** **L1** **ENTER** .
6. Press **2ndF** **EXE** to compute the statistical test.
7. The first item on the screen,  $\mu > 8$ , is the alternate hypothesis of the statistical test. The second item on the screen is the observed statistic from the sample. The third item on the screen is the decision statistic or  $p$  value.
8. The  $p$  value is .201, which is greater than .05. Our decision is to support the null hypothesis that  $\mu=8$ . This test shows that "da Bears" average 8 wins a season and thus are .500 ball club. However, the fourth item shows that on the average, "da Bears" win approximately 8.56 games a season, which says they are winners.

# STATISTICAL TESTS (continued)

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## Steps for performing a two-small-sample hypothesis test for the population means

1. Access the data entry screen and enter the additional data for L2.

(Use the Bears data in L1.):

L2 Packers	8	5	5	8	8	8	8	4	5	4	10	6
	4	9	9	9	11	13	13	11	8	9	12	

2. Check the data you have entered and correct any errors you may find.

The data shown above reflects the number of wins for the Green Bay Packers in each complete regular season since 1978. Test the alternate hypothesis that "da Bears" are a better (on the average win more games) football team than the Packers during these recent years.

3. Set up the statistical test by pressing **2ndF** **QUIT** **STAT** **E** (**TEST**) **0** **4** (**Ttest2samp**).

4. Set the alternate hypothesis to  $\mu_1 > \mu_2$  by pressing **▶** **▶** **ENTER**. Pool the standard deviations in the calculation by pressing **▼** **▶** **ENTER**. Set the List1 to L1 by pressing **▼** **2ndF** **L1** **ENTER**. Set List2 to L2 by pressing **2ndF** **L2** **ENTER**. Press **2ndF** **EXE** to compute the statistical test.

5. The first item on the screen,  $\mu_1 > \mu_2$ , is the alternate hypothesis of the statistical test. The second item is the observed statistic from the sample. The third item is decision statistic or  $p$  value. In our problem, the  $p$  value is .3119 which is more than .05. Our decision is to support the null hypothesis that  $\mu_1 = \mu_2$ . This test shows that "da Bears" average about the same number of wins a season as the Packers. However, the fifth and sixth values show, on the average, "da Bears" win approximately 8.56 games a season, whereas the Packers win 8.13. The Bears win more on the average, but statistically, they are not significantly different.