Notes for the TI-83, 83+, 84 Calculator

To adjust the contrast:

| 2nd | | (hold) ^ |

or

| 2nd | | (hold) V |

| ALPHA | to get one capital letter

| 2nd | | ALPHA | All keys pressed will be capital

To get back to top key value, press | ALPHA | once.

| | represents the keys

[   ]   represents yellow command or green letter behind a key

<   >   represents screen menu items

If you hit a wrong button, just hit | CLEAR | and start again.

Scientific Notation:

$4.321 \text{ E } 4 = 4.321 \times 10^4$ $4.321 \text{ E } -4 = 4.231 \times 10^{-4}$

To transfer programs or equations from one calculator to another:

Both calculators: insert cable; press in cable completely. | 2nd | [LINK]

Calculator receiving information: <RECEIVE> Press right arrow to receive.

| ENTER |

Calculator sending information: | | Press appropriate number or letter. Use up and down arrows to access appropriate item.

| ENTER | To select item to transfer.

<TRANSMIT> Press right arrow to access transmit.

| ENTER | **NOTE: ERROR 35 LINK** generally means that the cables have not been inserted far enough.

Both calculators: | 2nd | [QUIT] To exit when done.

LET'S START. Given:

Data	Frequency
-2	10
-1	3
0	4
1	5
3	8

(We are manipulating 1 variable statistics.)

Note: These directions are for entering data with the built-in statistical program.

Press	Function	

| ON | Turns on the calculator.

| STAT | Access statistics mode.

press down arrow 3 times   Arrow down to <4:ClrList> to clear data from lists, if desired.

| ENTER | (Or, press | 4 | .)

2nd	[L1]	ENTER	Enter list L1 to be cleared.
2nd	[ENTRY]		Displays last instruction.

<	2nd	
[L2]	ENTER	Continue clearing remaining lists in the same fashion, if desired.
	STAT	Access statistics mode.

ENTER   Select <1:Edit . . .>   Enter data. Data values go into L1.
You may need to arrow over to L1.
Type in a data value, press   ENTER
Continue in the same manner until all data values are entered.
(For negative numbers, use the   (-)   key at the bottom
of the keypad.)

>   In L2, enter the frequencies for each data value in L1.
Type in a frequency, press   ENTER
If a data value appears only once, the frequency is "1".

STAT   Access statistics mode.

>   To access <CALC>   (perform calculations on the data)

ENTER		<1:1-var Stats>
2nd [L1]	,	To access 1 variable statistics with the data in L1
2nd [L2]	ENTER	and the frequencies in L2.

$\bar{x}$ = .2   (sample mean)
Σx = 6
Σx^2 = 120
$S x$ = 2.023994003   (sample standard deviation)
σx = 1.989974874   (population standard deviation)
$\vee n$ = 30   (sample size)

V   Arrow down to get remaining statistics. Repeat as necessary.
The calculator displays:

     minX = -2   (minimum data value)
     Q_1 = -2   (first quartile)
     Med = 0   (median)
     Q_3 = 3   (third quartile)
     maxX = 3   (maximum data value)

To draw histograms:

We will assume that the data is already entered.
We will construct 2 histograms with the built-in "STATPLOT".
The first way will use the default ZOOM.
The second way will involve customizing the graph.

	Press	Function	

2nd	[STAT PLOT]	To access graphing mode.
	ENTER	Select <1:plot 1> To access plotting - first graph.
<ON>	ENTER	Use the arrows to go to <ON> to turn on Plot 1.
		Use the arrows to go to the histogram picture.
	ENTER	Select the histogram.
		Use the arrows to go to "Xlist"
		If "L1" is not selected, press 2nd [L1] to select it.
	ENTER	States that the data values are in L1.
		Use the arrows to go to "Freq".
2nd	[L2] ENTER	States that the frequencies are in L2.
2nd	[STAT PLOT]	Go back to access other graphs.
		Use the arrows to turn **off** the remaining plots.

Be sure to deselect or clear all equations before graphing.
To deselect equations:

Y =	If any equations appear, arrow over so = is covered.Then, press ENTER to deselect the equation. Continue, until all equations are deselected.

To clear equations:

Y =	If any equations appear, arrow over to the right of each = Then, press clear until all equations are deleted.

To draw default histogram:

ZOOM	
9	Arrow down to <9:ZoomStat> or press the number 9. The histogram will show with a window automatically set.

To draw custom histogram:

WINDOW	To access WINDOW to set the graph parameters.
	Xmin = -2.5
	Xmax = 3.5
	Xscl = 1 (width of bars)
	Ymin = 0
	Ymax = 10
	Yscl = 1 (spacing of tick marks on y-axis)
	Xres = 1
GRAPH	Histogram should appear.

To draw box plots:

| 2nd | [STAT PLOT] | To access graphing mode. |

Select <1:Plot 1> To access plotting - first graph.

| | ENTER | |
| <ON> | ENTER | Use the arrows to go to <ON> to turn on Plot 1. |

Use the arrows to go to the box plot picture.
| ENTER | Select the box plot. |

Use the arrows to go to "Xlist"
If "L1" is not selected, press [2nd] [L1] to select it.
| ENTER | States that the data values are in L1. |

Use the arrows to go to "Freq".
| 2nd | [L2] | ENTER | States that the frequencies are in L2. |
| 2nd | [STAT PLOT] | Go back to access other graphs. |
Use the arrows to turn off the remaining plots.

Be sure to deselect or clear all equations before graphing.

To deselect equations:
| Y = | If any equations appear, arrow over so [=] is
covered.Then, press [ENTER] to deselect the equation.
Continue, until all equations are deselected.

To clear equations:
| Y = | If any equations appear, arrow over to the right of each
[=] Then, press clear until all equations are deleted.
| GRAPH | Box plot should appear.
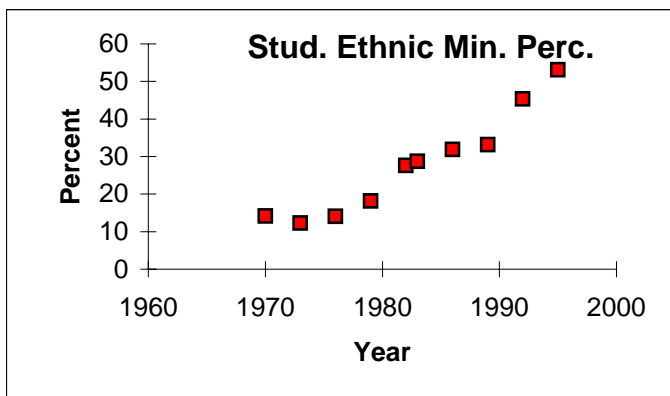
Linear Regression

Given: The following data is real. The percent of declared ethnic minority students at
De Anza College for selected years from 1970 - 1995 was:

Year	Student Ethnic Minority Percent
1970	14.13
1973	12.27
1976	14.08
1979	18.16
1982	27.64
1983	28.72
1986	31.86
1989	33.14
1992	45.37
1995	53.1

Independent Variable: Year (x-values)
Dependent Variable: Student Ethnic Minority Percent (y-values)

By hand, verify the scatterplot below:

To enter data and do linear regression:
       **Note: The TI-83 has a built-in linear regression feature, which
       allows the data to be edited. The x-values will be in L1; the y-values in L2.**

	Press	Function	
	ON	Turns calculator on	
2nd	[STAT PLOT]	Before accessing this program, be sure to turn off all plots. To access graphing mode.	
4	ENTER	To turn off all plots.	

		Round to 3 decimal places. To do so:
	MODE	
	V	Arrow down to "Float" and then to the right to "3".
	ENTER	All numbers will be rounded to 3 decimal places until changed.
STAT	4	Enter statistics mode and clear lists L1 and L2.
2nd [L1]	ENTER	
STAT	4	
2nd [L2]	ENTER	
STAT	ENTER	Enter editing mode to insert values for **x** and **y**.

Enter each value. Press arrows or ENTER to continue.
(You may need to use the arrow keys to go to L1.)

After the data has been entered:

By default, the correlation coefficient is not displayed.
To display the correlation coefficient:

2nd	[CATALOG]	Arrow down until "DiagnosticOn".
ENTER	ENTER	r and r^2 will be displayed during regression calculations.
STAT	>	Access linear regression in the form of
8	ENTER	$\hat{y} = a + bx$

The display shows:
   LinReg
   y = a + bx
   a = -3176.909
   b = 1.617
   r^2 = .924
   r = .961

This means the Line of Best Fit (Least Squares Line) is:

$\hat{y} = a + bx$ $\hat{y} = -3176.909 + 1.617x$
Percent = -3176.909 + (1.617)(year #)

The correlation coefficient r = .961

To see the scatter plot:

2nd	[STAT PLOT]	To access graphing mode.
	ENTER	Select <1:plot 1> To access plotting - first graph.
<ON>	ENTER	Use the arrows to go to <ON> to turn on Plot 1.

| | | Use the arrows to go to the first picture. |
| | ENTER | Select the scatter plot. |

		Use the arrows to go to "Xlist"
		If "L1" is not selected, press 2nd [L1] to select it.
	ENTER	States that the data values are in L1.

		Use the arrows to go to "Ylist"
2nd	[L2] ENTER	States that the frequencies are in L2.
2nd	[STAT PLOT]	Go back to access other graphs.
		Use the arrows to turn **off** the remaining plots.
	WINDOW	To access WINDOW to set the graph parameters.

> Xmin = 1970
> Xmax = 2000
> Xscl = 10   (spacing of tick marks on x-axis)
> Ymin = -.05
> Ymax = 60
> Yscl = 10   (spacing of tick marks on y-axis)
> Xres = 1

Be sure to deselect or clear all equations before graphing.
To deselect equations:

| Y = | If any equations appear, arrow over so   =   covered.Then, press   ENTER   to deselect the equation. Continue, until all equations are deselected. |

To clear equations:

| Y = | If any equations appear, arrow over to the right of each   =   Then, press clear until all equations are deleted. |

| GRAPH | Scatter plot should appear. |

To see the regression graph:

| Y = | Regression equation will be put into Y1. |

| VARS | 5 | Go to "5: Statistics" . |

| > | > | Arrow over to "EQ" . |

| ENTER | "1: RegEQ" contains the regression equation which will be entered in Y1. |

| GRAPH | Regression line will be superimposed over scatter plot. |

To see the residuals and use them to calculate the critical point for an outlier:

2nd	[LIST]	RESID will be an item on the menu. Arrow down to it.
ENTER	ENTER	The list of residuals will be displayed. Use the arrows to view them.

The critical point for an outlier is: $1.9* \sqrt{(SSE/(n-2))}$,
        where: n = number of pairs of data and
                SSE = sum of the squared errors
                SSE = Σ (residual)^2

STO >	2nd	Residuals are now in L3.
[L3]	ENTER	
2nd [L3]	x^2	
/	8	n = 10 pairs, in this example. So, n - 2 = 8.
STO >	2nd	
[L4]	ENTER	L4 now contains each: (residual)^2 / (n - 2) .
1.9 x 2nd		
[v] 2nd [LIST]		
> > 5		
2nd	[L4]	
)) ENTER		Calculator displays: 7.642669563 .

This is the critical value.
Compare the absolute value of each residual value in L3 to 7.64 .
If the absolute value is greater than 7.64, then the (x, y) corresponding
point is an outlier. In this case, none of the points is an outlier.

To obtain estimates of y for various x-values:

There are various ways to determine estimates for "y".
One way is to substitute values for "x" in the equation.
Another way is to use the   TRACE   on the graph of the
     regression line.