

## Best Fit Line on the Calculator - Two Lines

Often you are given two sets of outputs for the same inputs, and you want to find linear models for each. For example, suppose you have the following table:

$x$	-2	-1	0	1	2	3
$y_1$	5	6	2	1	-3	-5
$y_2$	-3	-1	0	3	4	7

After putting the  $x$ -values in  $L_1$ , the  $y_1$ -values in  $L_2$ , and the  $y_2$ -values in  $L_3$ , we are ready to find the equations.

Press **STAT**, then arrow the cursor to the right so that it's in the CALC column and press **4** for the linear regression option. Notice that it gives the formula in  $ax + b$  form, when we are used to  $mx + b$  form. No problem, the  $a$  that it calculates will be the slope. The default for the LinReg(ax+b) command is to take the input values from  $L_1$  and the output values from  $L_2$ . This will work for the formula for  $y_1$ , so press **ENTER** and you should see the following on the home screen:

```
LinReg
y=ax+b
a=-2.228571429
b=2.114285714
r^2=.9246200608
r=-.9615716618
```

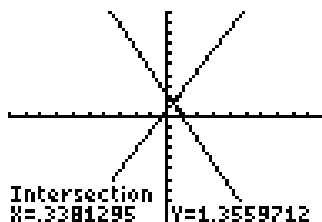


The calculator is saying that the best fit line for this data (with the slope and “ $b$ ” rounded to 2 decimal places) is  $y_1 = -2.23x + 2.11$ . To get the second equation, this time press **STAT**, then arrow the cursor to the right so that it's in the CALC column and press **4** for the linear regression option. Before pressing **ENTER**, press **2ND**-**L1**, **,** **2ND**-**L3**. This time, the screen should show:

```
LinReg
y=ax+b
a=1.942857143
b=.6952380952
r^2=.9810466761
r=.9904780038
```



This gives the best fit line for  $y_2$  as  $y_2 = 1.94x + 0.70$ . Put both equations into the  $y =$  screen and press **ZOOM**-6 to see the graph. The intersection can be obtained by pressing **2ND**-**CALC**-5, then by pressing **ENTER** three times. The graph after the calculator has found the intersection looks like the picture below:



If you want to see the scattergram of the data for each line plotted as well, we should set up the statplots. Press **2ND**-**STAT PLOT**-1 to see the details of the first plot. To plot  $L_1$  v.s.  $L_2$  using little squares for the points, make sure the first statplot screen looks like the following:

```

Plot1 Plot2 Plot3
Off Off
Type: [ ] [ ] [ ]
      [ ] [ ] [ ]
Xlist:L1
Ylist:L2
Mark: [ ] + .
  
```

The second statplot to plot  $L_1$  v.s.  $L_3$  using little pluses for the points, make sure the second statplot screen looks like the following:

```

Plot1 Plot2 Plot3
Off Off
Type: [ ] [ ] [ ]
      [ ] [ ] [ ]
Xlist:L1
Ylist:L3
Mark: [ ] + .
  
```

Press graph to see the following:

