8-14-2006

Line of Best Fit (Trend Line)

John Picarella
The College at Brockport

Name: John Picarella

Grade Level(s)/Subjects: 9-12, Algebra IIB Honors, Intermediate Algebra

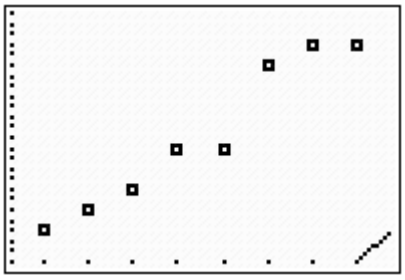
Objective: Students will use math modeling to provide a means of presenting and interpreting data collected and entered into the calculator, and then determine the formula for the line of best fit (trend line) for the data collected. They will determine the correlation between the data collected and the line and then interpolate and extrapolate additional data points.

Materials: TI-83 plus calculators, and a tape measure. All students should have paper and pencil.

I would plan to begin the lesson by collecting data. We would separate the class into male and female groups and then each student would determine their shoe size and find their height (to the half inch).This data would be entered into a table as shown here:

	A	B
1	Shoe Size	Height In Inches
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Once the data has been collected, the students will use the graphing calculator to represent the data with a scatter plot by entering the data for shoe size in List 1 and the data for height in List 2. They will then set the STAT PLOT for a scatter plot and graph the data. The window on the calculator will have to be adjusted to clearly display the data and graph by pressing ZOOM 9 and will appear something similar to this:



The students will then be asked to make a determination by looking at the scatter plot whether they believe it shows a positive or negative correlation.

We will then use the calculator to show us the correlation and equation for our line in the form of y = ax + b. The keystrokes on the calculator will be the following:

STAT) 4 2nd 1 ,

2nd 2 ENTER

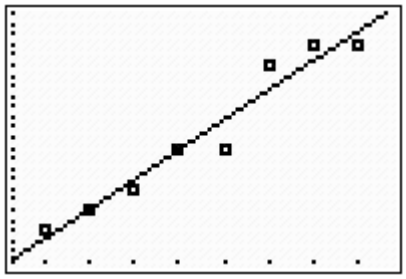
What is being accomplished here is calling for the statistics function (LinReg), and taking the data we entered into the calculator to determine the trend line. The screen will appear to look something like the following:

```
LinReg
 y=ax+b
 a=2.880952381
 b=39
 r²=.948558471
 r=.973939665
```

The students are already familiar with the equation for a line and from the above listing, should be able to determine the equation for this trend line (rounded to the nearest hundredth).

We will then check the equation for the line of best fit with the calculator by entering the following:

This will plot the trend line through the scatter plot giving a screen that will be similar to this:



We will then discuss about the trend line “hitting” all the data points and what that means. Finally, we will conclude the lesson by interpolating how tall someone with a size 11.5(or some size within the range of class shoe sizes) shoe size will fall on our trend line, as well as extrapolate what will be the shoe size of someone who is outside of the range of heights of our class of students. Both of these will be determined by taking the equation of the trend line and substituting for the x-value or y-value.

Shoe Size vs Height
Line of Best Fit – TI Calculator Work

Project Grade:	Excellent	Good	Needs Improvement	Poor
Participation and cooperation – 25%	Student participated during data collection and worked well with other students during group work. Student did not require redirection.	Student participated during data collection and worked well with other students during group work. Student required redirection one time.	Student did not participate during data collection and did not work well with other students during group work. Student required redirection two times.	Student did not participate during data collection and did not work well with other students during group work. Student had to be removed from group to work independently.
Tables - 25%	Tables for the height and shoe sizes for students in the group were completed and entered into the TI and had no errors.	Tables for the height and shoe sizes for students in the group were completed and the table showed one or two errors.	Tables were incomplete and/or the table showed three or more mistakes each.	Tables were incomplete and/or two or more tables showed five errors or more each.
TI graph – 25%	TI scatter plots and line of best fit for the shoe size vs height were completed and were free of errors.	TI scatter plots and line of best fit for the shoe size vs height were completed but the results were not consistent because of up to three plotting errors were made because of mistakes made in tables.	TI scatter plots and line of best fit for the shoe size vs height were incomplete, or students needed assistance in order to complete the graphs.	TI graphs were incomplete. Students could not complete the graphs because of mistakes made in tables, or incorrect keystroke sequences.
Worksheet – 25%	The equation for the trend line was written. Correct substitutions were made for the interpolation and extrapolation of data and the problems were correctly solved and were free of errors.	The equation for the correct trend line was written, but 1-2 mistakes were made in the substitution and solving of the equations.	The equation for the correct trend line was written, but >2 mistakes were made in the substitution and solving of the equations and/or the problems were not solved.	The equation for the trend line was not written, no substitutions made and no solutions worked out for the extrapolation and interpolation of data.