Line of Best Fit

Linear Models and Correlation

This lesson incorporates how to write a linear model to represent a collection of data points, and how to interpret the correlation of a linear regression. Since there is no single line that passes through all data points, you will try to find the line of best fit. This is called the best-fitting line. Graphing calculators have built-in programs to generate the linear model and the correlation, but we will look at more of a hand on approach to solving.

**Goals**

* The student will find a linear equation that approximates a set of data points.
* The student will determine the correlation of a real-life data.

**Objectives**

* Given a set of data, the student will find a linear equation that best fits the students data with 100% accuracy.
* Given a student created scatter plot, the student will determine the correlation of the data with 100% accuracy.

**Materials**

* Measuring Tape (1 for each group)
* Graphing Paper (1 for each group)
* Data Collecting Sheet (1 for each group)
* Ruler

**Procedure**

A. Collect the Data

1. The class will be split up into groups of four to six students.
2. Each team will receive a measuring tape, graph paper, and the data collection sheet.
3. One by one each member in the group will measure the length of their feet (in inches) and their forearm (in inches). Shoes cannot be worn!
4. Once all of the heights are recorded each team will create a scatter plot. The x-axis will be the foot size and the y-axis will be the height. Make sure everything is labeled!

|  |  |  |
| --- | --- | --- |
| **Student Name** | **Forearm (In Inches)** | **Foot (In Inches)** |
|  |  |  |
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**B. Find the Line of Best Fit**

1. With all of the data collected, each group will draw a straight line on you scatter plot that goes through as many points as possible. Sketch a line that seems to fit the data best.
2. With your line drawn, each group will determine an equation to find the line of best fit. (y=mx+b)
3. In order to find your equation pick points that lay on your line or very close to the line you have drawn.

The slope (m) = $\frac{\left(Y2-Y1\right)}{(X2-X1)}$

X = Foot length

Y = Forearm length

**y = mx+b**

With the points, find “b” and solve!

**C. Analyze the Data**

1. Determine if there is a correlation between the length of your foot and the length of your forearm.
2. Make predictions using your equation.

Correlation is the number that indicates how well a particular set of data can be approximated by a straight line. Correlation is represented by the letter *r*, and can be **negative**, **positive**, or **no correlation**.



**Connections**

1. What other sets of data could be useful when talking about correlation?
2. What are some factors that could have caused your data to be wrong?

**Resources**

Fitting a Line to Data. (n.d.). *Classzone*. Retrieved April 23, 2012, from <http://http://cphs.dadeschools.net/departments/mathematics/ebooks/alg1mcd/Source/LA105EAD.pdf>

Line of Best Fit. (n.d.). MathBits. Retrieved April 24, 2012, from <http://http://mathbits.com/mathbits/tisection/statistics1/linefit.htm>

Line of Best Fit

Using the Calculator



Step 1:

Put your data into your calculator by

hitting STAT and selecting **1:Edit**

Step 2:



Enter your data. X values is L1 and

Y values in L2.

Step 3:



Once your data is entered hit STAT

and move right to the CALC tab. Select

**4:LinReg(ax+b)** and hit ENTER.

Step 4: Once you hit enter you will see you a value (slope) your b value and the correlation, *r.*

The closer *r* is to one it has a positive correlation.

The closer *r* is to negative one it has a negative correlation.

The closer *r* is or is equal to zero it has relativity no correlation.



Our correlation is .906 and it is positive!