

# Regression Analysis and the Correlation Coefficient

Fitting a line or curve to a set of data points is called *regression analysis*. A regression model can be classified according to the type of curve that is fitted to the data which is entered into L<sub>1</sub> and L<sub>2</sub>

A **linear regression** model has the form  $y = ax + b$

An **exponential regression** model has the form  $y = a \cdot b^x$

A **logarithmic regression** model has the form  $y = a + b \ln x$

A **power regression** model has the form  $y = a \cdot x^b$

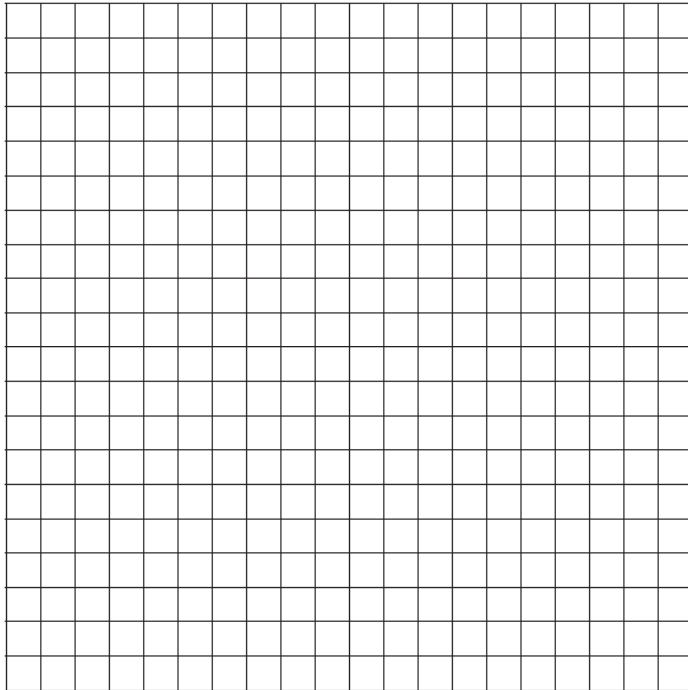
A **quadratic regression** model has the form  $y = ax^2 + bx + c$

*Examples:*

- Two different tests were designed to measure understanding of a topic. The two tests were given to ten students with the following results:

Test <i>x</i>	75	78	88	92	95	67	58	72	74	81
Test <i>y</i>	81	73	85	88	89	73	66	75	70	78

Construct a scatter plot for these scores, and then write an equation for the line of best fit (round slope and intercept to the *nearest hundredth*).



Find the correlation coefficient. (see directions at right)

Predict the score, to the *nearest integer*, on test *y* for a student who scored 87 on test *x*.

How well does your regression equation truly represent your set of data? One of the ways to determine the answer to this question is to examine the **correlation coefficient**,  $r$ .

The value of  $r$  is between  $-1$  and  $+1$ . The closer  $r$  is to  $+1$  or  $-1$ , the stronger the correlation. If  $r > 0$  then we have a *positive correlation*, and if  $r < 0$  we have a *negative correlation*. If  $r$  is close to zero, then we have *no correlation*.

To find the correlation coefficient,  $r$ , you will need to make sure that the Diagnostic flag is turned on. When the calculator is reset, your Diagnostic flag will be turned off, so you will need to turn your Diagnostics back on.

To turn the Diagnostics on:

- Press 2nd CATALOG (above the numeral zero) to display the Catalog in alpha mode (note the A in the upper right hand corner).
 

```

CATALOG
DependAsk
DependAuto
det(
DiagnosticOff
▶DiagnosticOn
dim(
Disp
                
```
- Press D (to fast forward to the D's) and use the down arrow ▼ to move the pointer to DiagnosticOn.
- Press ENTER. DiagnosticOn will appear on the home screen. Press ENTER and "Done" will appear.

The correlation coefficient,  $r$ , will appear on the screen that shows the regression equation information as shown at right.

```

LinReg
y=ax+b
a=1.690909091
b=.2727272727
r²=.9701626472
r=.9849683483
                
```

