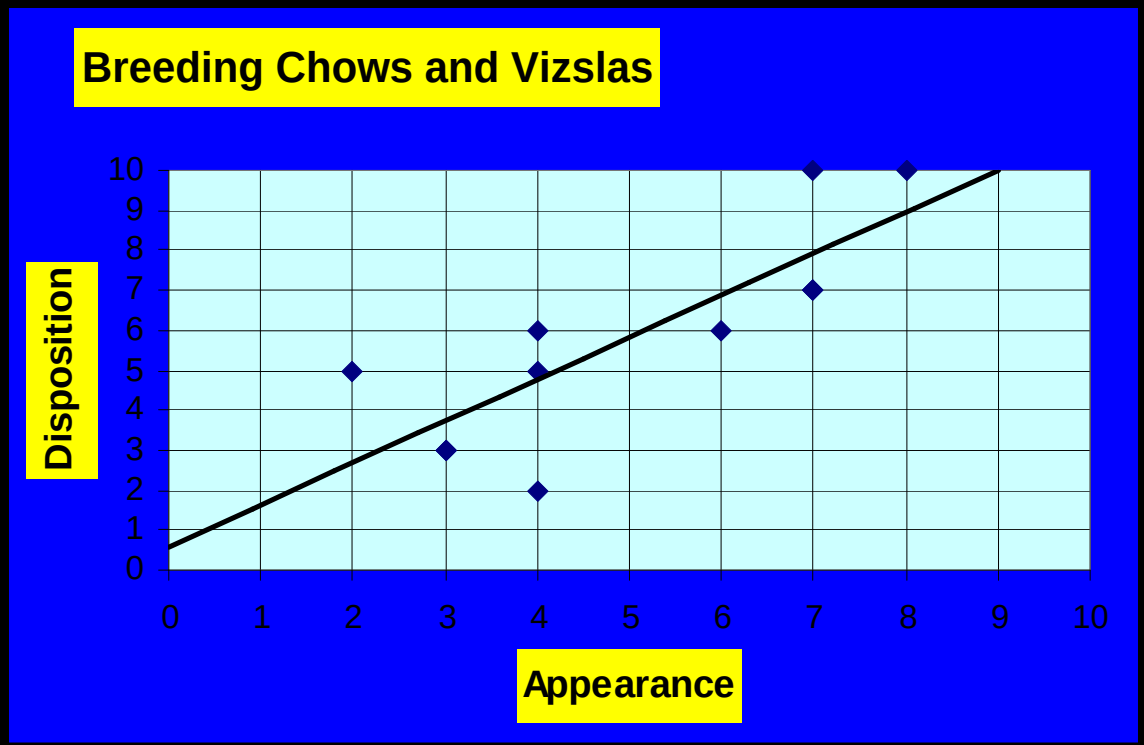
Curve Fitting



Source of Example

The chow/vizsla example is from "Lessons for A First Course in System Dynamics Modeling v1.0" by Diana M. Fisher.

Summer Creek Press, 1998.

Procedure

- Given paired data points (x_i,y_i).
- Produce a *scatterplot* of the paired data points.
- Fit a *linear equation*

$$Y = aX+b$$

  and its graph (curve) to the data.
- Evaluate the fit.
- Analyze the result.

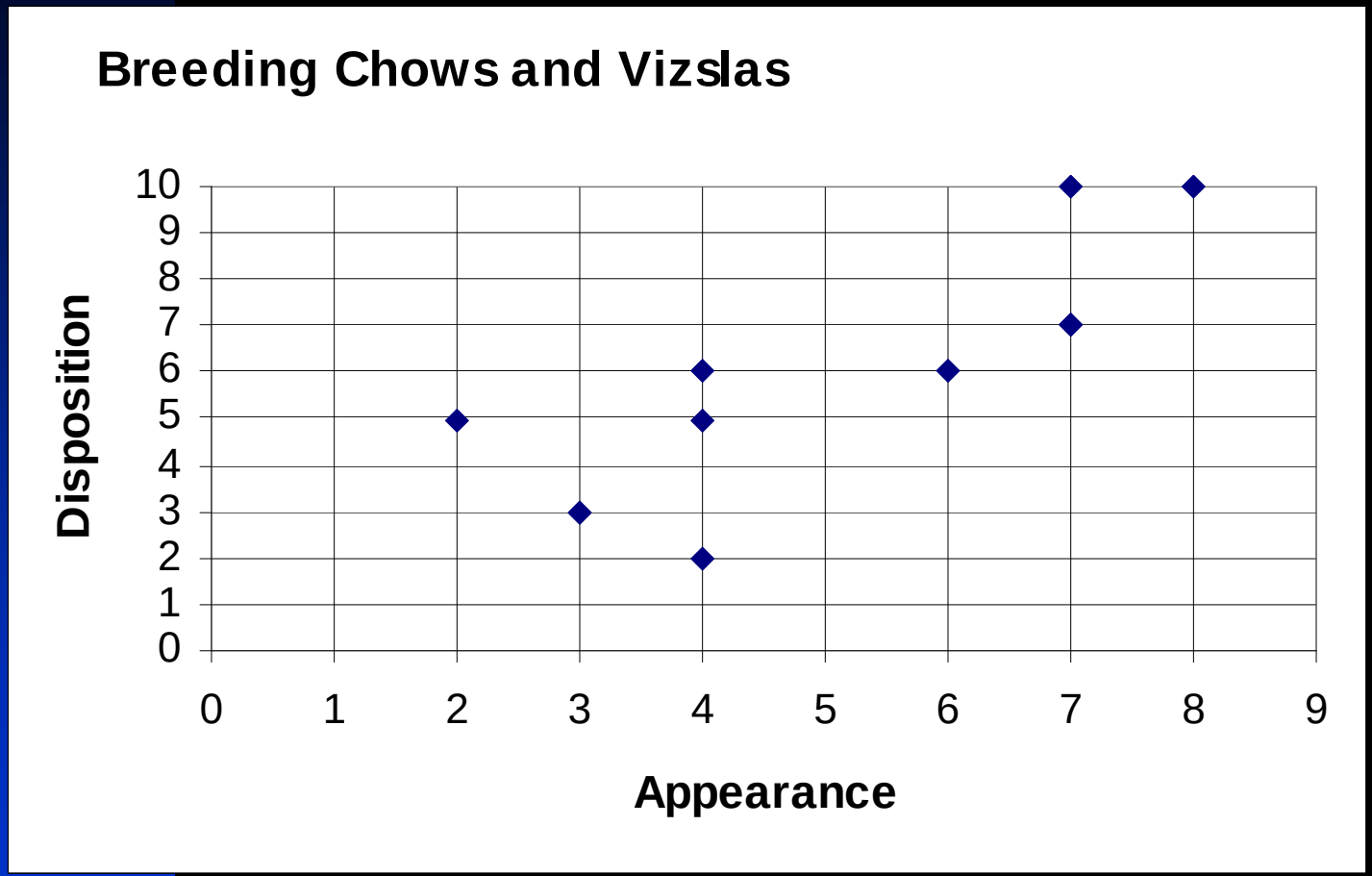
Research Question

- Can the appearance of a chow-vizsla hybrid be used to predict its disposition?
- Dogs are rated based upon their chow-like and vizsla-like characteristics.
- Scale 0 (most like vizsla) to 10 (most like chow).

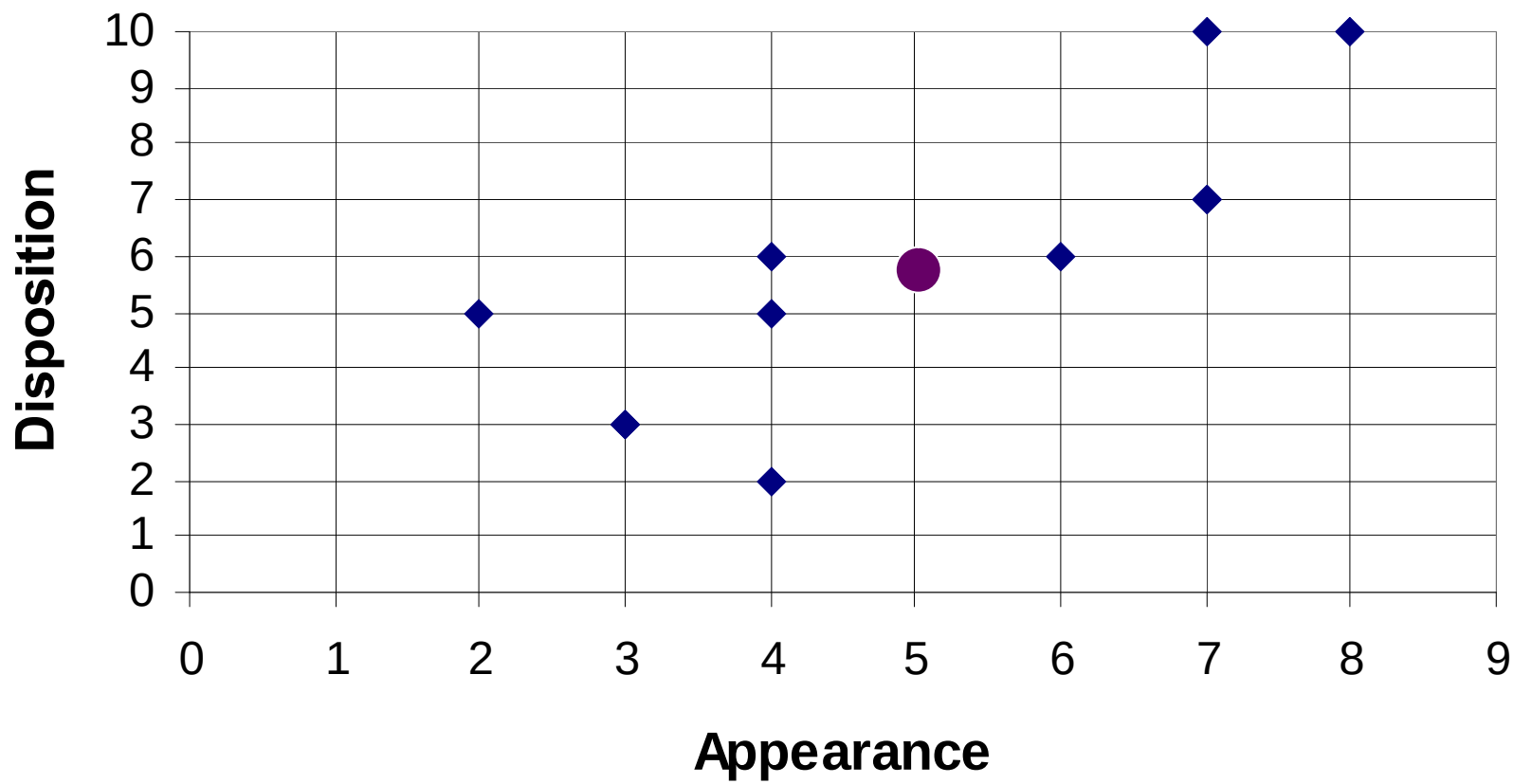
Table of Data

Breeding Chows and Vizslas		
Dog	**Appearance**	**Disposition**
Sam	4	2
Jake	6	6
Gus	7	7
Max	3	3
Suzie	7	10
Rover	8	10
Zeek	2	5
Rex	4	6
Tiesha	3	3
BJ	4	5
Missy	7	7
Mean	**5**	**5.82**

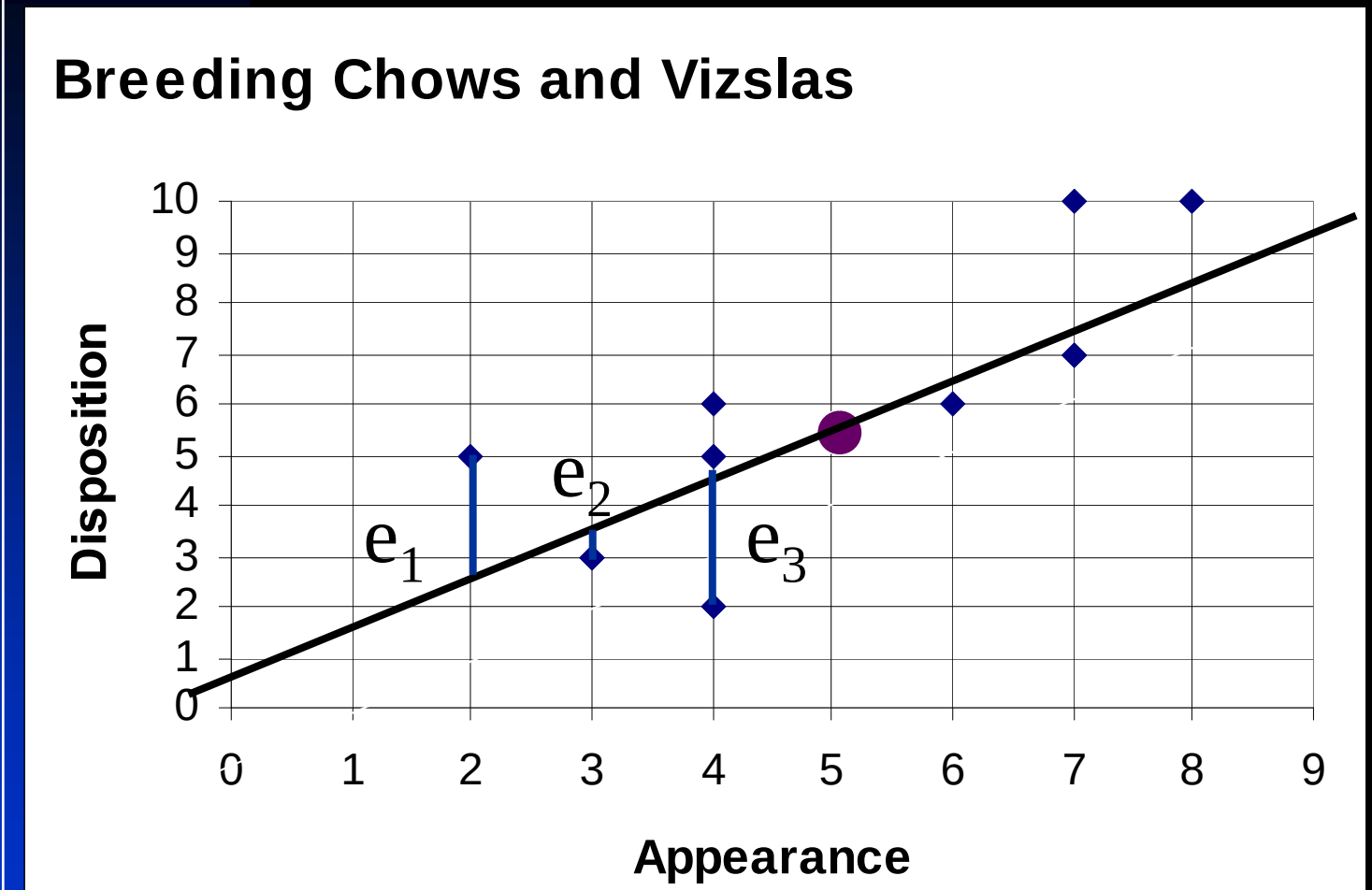
Scatterplot of Data



Plotting the Means ($\underline{x}$,$\underline{y}$)=(5,5.82)



Adding a Trendline



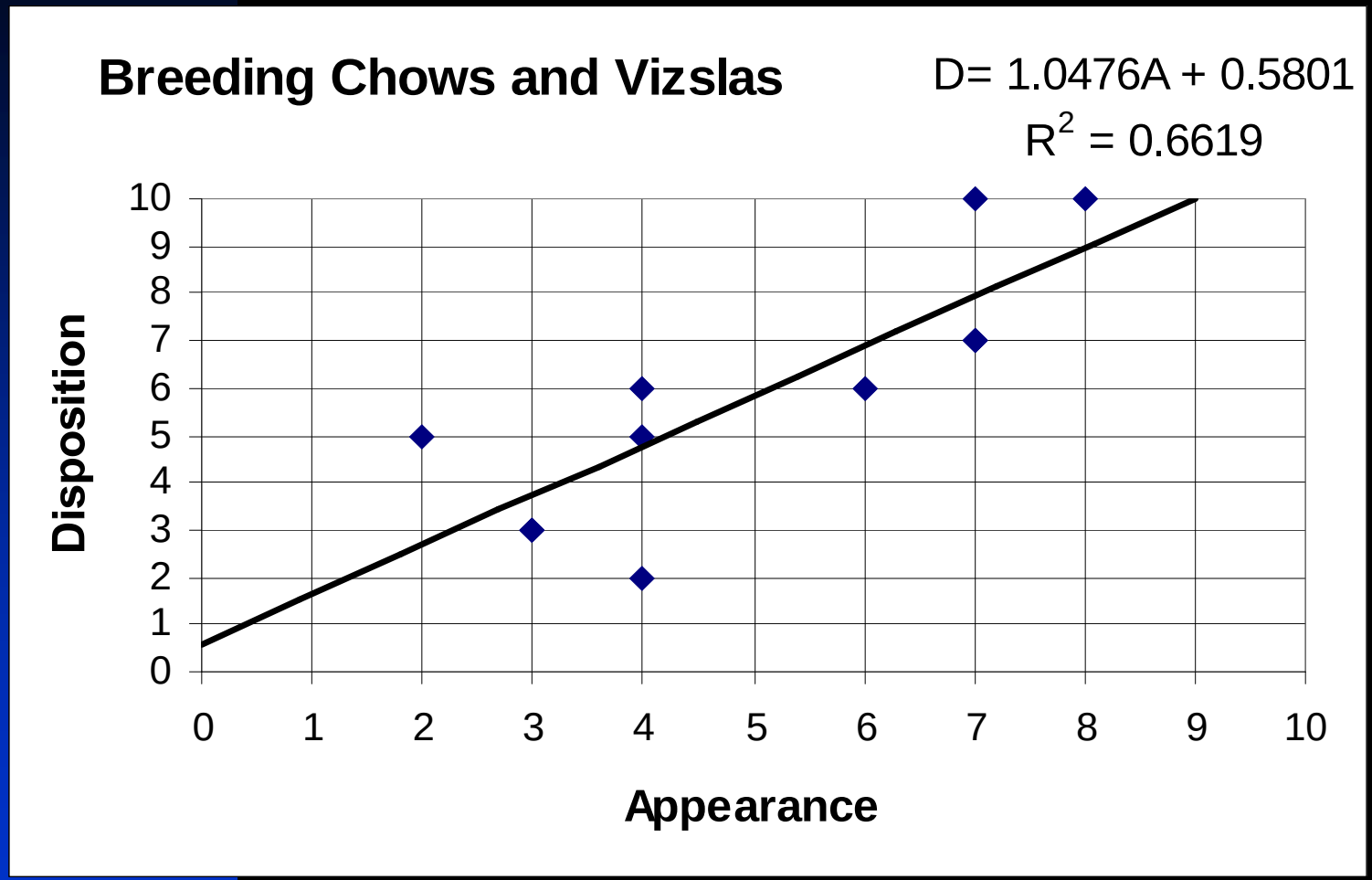
Least Squares Fit

- Minimize the *error sum of squares*

$$Q = \Sigma (e_i)^2$$

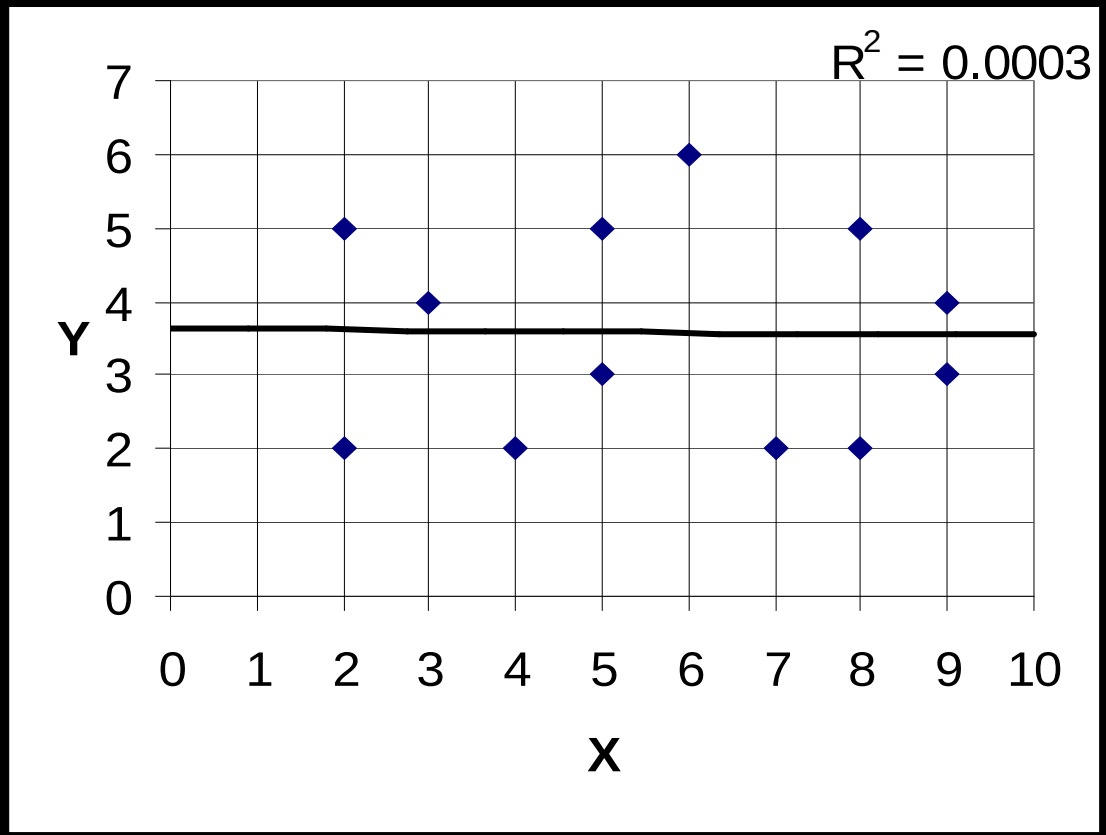
- The smaller Q, the closer the *correlation coefficient* R^2 is to 1.
- A perfect fit (all points on the line) has $R^2=1$.

Trendline and Equation



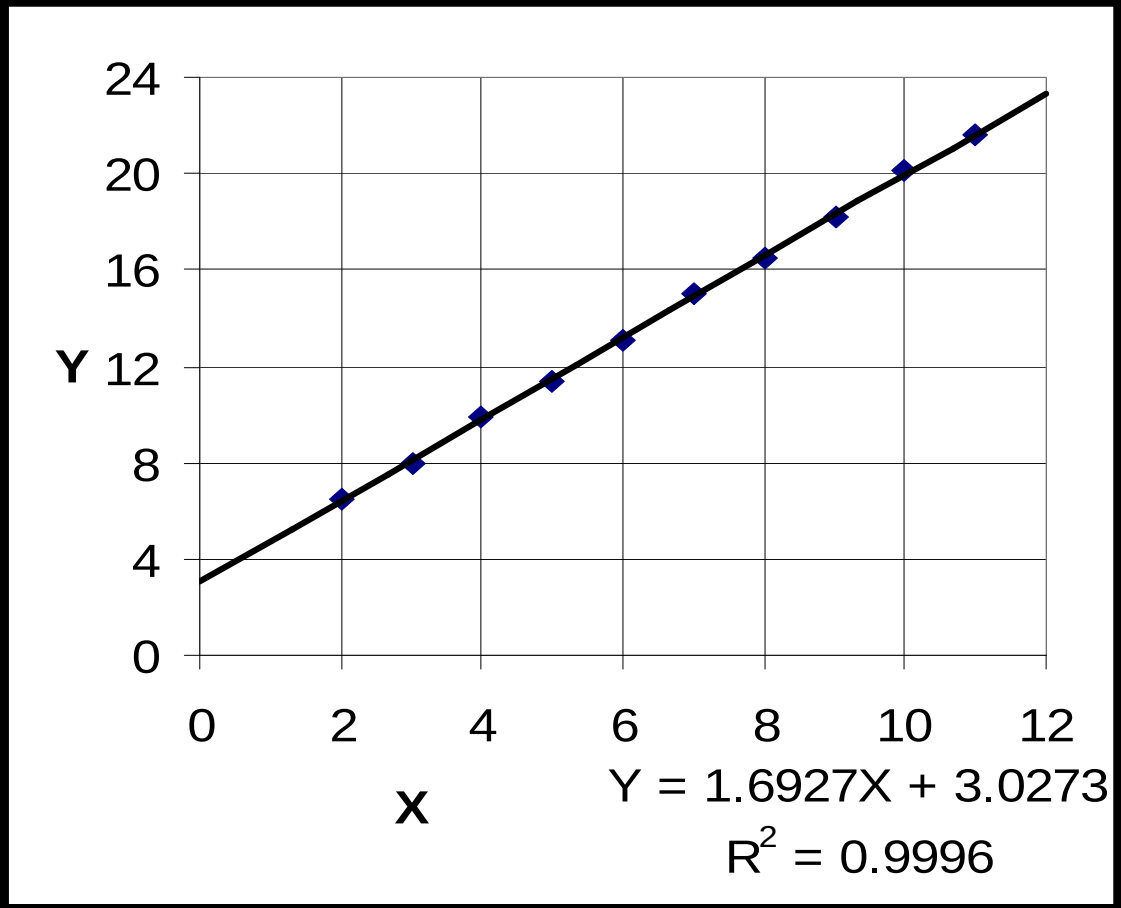
No Correlation

- This graph shows essentially no correlation between the variables X and Y.



High Correlation

- This graph shows a high degree of correlation between X and Y.



Outliers

- Outliers affect the degree of correlation.
- Outliers affect the fitted curve.