

# Engineering Distance Education

September 27, 2002

**Why I Like Power Point:**

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Technology for Distance Education

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**Why I Like Power Point**

- Presentation slides.
- Presentation handouts.
- Notes page.
- Equations.
- Cut and Paste.

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**Presentation Slides**

- Extended Outline
  - The skeleton.
  - The flesh is added during the presentation.
  - Use a large enough font.

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**Manatees and Motor Boats**

- Question: Is there a relationship between the number of motor boats and the number of manatee kills?
- Data Collection: Obtain the number of motor boats registered in Florida and the number of manatees killed for each year from the Dept. of Natural Resources.

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**Manatees and Motor Boats**

- Question: Is there a relationship between the number of motor boats and the number of manatee kills?

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**Manatees and Motor Boats**

- Data Collection: Obtain the number of motor boats registered in Florida and the number of manatees killed for each year from the Dept. of Natural Resources.

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## Data (Excel spread sheet)

Year	Boats (thousands)	Manatees killed
1977	447	13
1978	460	21
1979	481	24
1980	498	16
1981	513	24
1982	512	20
1983	526	15
1984	559	34
1985	585	33
1986	614	33
1987	645	39
1988	675	43
1989	711	50
1990	719	47

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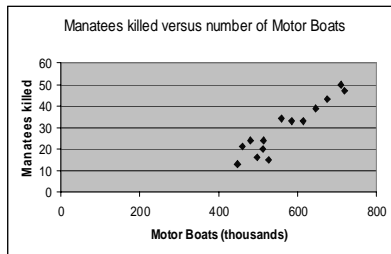
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## Plot of Data (Excel)



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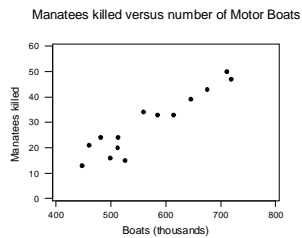
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## Plot of Data (Minitab)



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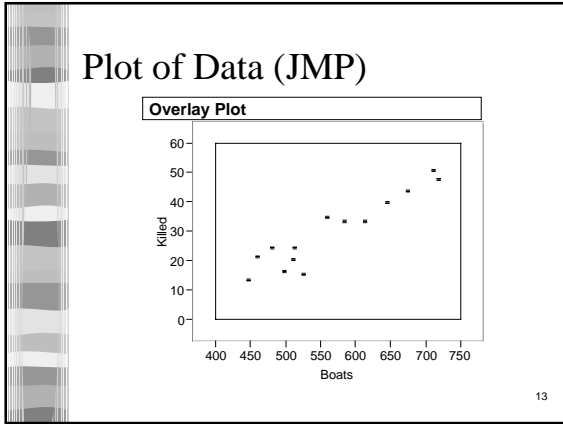
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### Correlation

- The correlation coefficient is a measure of the strength of the linear relationship between two variables.
- The correlation coefficient is always between -1 and +1.
- A value of -1 indicates a perfect inverse (negative) linear relationship and a value of +1 indicates a perfect direct (positive) linear relationship.

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### Correlation Coefficient

- Measures the strength of a linear relationship.
- Between -1 and +1.
- -1 → perfect negative.
- +1 → perfect positive.

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## Correlation

- To compute the value of the correlation coefficient, you need the sample standard deviation for each variable and the sample covariance between the two variables.

$$r = \frac{(\sum(X - \bar{X})(Y - \bar{Y}))}{(n-1)s_X s_Y}$$

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## Correlation Coefficient

- To compute the value of the correlation coefficient, you need the sample standard deviation for each variable and the sample covariance between the two variables.

$$r = \frac{(\sum(X - \bar{X})(Y - \bar{Y}))}{(n-1)s_X s_Y}$$

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## Linear Regression

- One can use the correlation to come up with the slope and intercept of a straight line that approximates the linear relationship between two variables.

$$\text{slope} = r \left( \frac{s_Y}{s_X} \right)$$

$$\text{intercept} = \bar{Y} - \text{slope} * \bar{X}$$

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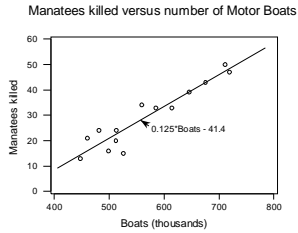
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## Linear Prediction Equation



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## Predicted # of manatee kills

- Using the regression equation, predict the number of manatee kills for a year with 716,000 registered motor boats
- Predicted Kills =  $0.125 * (716) - 41.4$   
= 48.1 or 48

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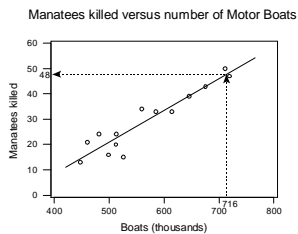
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## Predicted # of manatee kills



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