**5.7 Scatter Plots and Trend Lines**

**Objective 1:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* A **scatter plot** is a graph that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ two different sets of data by displaying them as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Scatter plots can be used to find \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in data.
* **Correlation** describes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between two things.
* Label the relationships illustrated in the scatterplots and give a description of each:



Example: Make a scatterplot of the data in the table. What type of relationship does the scatter plot show?





**Objective 2:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objective 3:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* When two sets of data have a positive or negative correlation, use a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to show the correlation more clearly.
* Trend lines can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ values.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is estimating a value between two known values.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is predicting a value outside the range of known values.
* The trend line that shows the relationship between sets of data is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is a number from -1 to 1 that tells how closely the equation models the data.

Example: Make a scatter plot of the data below. Draw a trend line and write its equation. What is the approximate body length of a 7-month-old panda? Did you use interpolation or extrapolation? Explain.





Example: Use a graphing calculator to find the equation of the line of best fit for the data. What is the correlation coefficient to three decimal places? Predict the cost of attending in the 2016-2017 academic year.

|  |  |
| --- | --- |
| Academic Year | Cost ($) |
| 2000-2001 | 3508 |
| 2001-2002 | 3766 |
| 2002-2003 | 4098 |
| 2003-2004 | 4645 |
| 2004-2005 | 5126 |
| 2005-2006 | 5492 |
| 2006-2007 | 5836 |

* Directions for TI-nspire
  + To create a spreadsheet of data: Select “Add Lists and Spreadsheets”
  + To create a scatterplot of data: Type “ctrl” then “doc” and select 5: “Add Data and Statistics”
    - Add variables along “x” and “y” axes.
  + To find line of best fit: Type “menu” and select 4: “Analyze” followed by 6: “regression” and then 1: “Linear”
  + To find the correlation coefficient: Type “doc” and select 4: “Insert” followed by 3: “Calculator”. Press “Menu” and select 6: “Statistics” followed by 7: “Stat Tests”. Choose option A: “Linear Reg t Tests”.

**Objective 4:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Causation** is when a change in one quantity \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a second quantity.
  + A correlation between quantities does not always imply causation.

Example: In the following situations, is there likely to be a correlation? If so, does the correlation reflect a causal relationship? Explain.

1. The number of loaves of bread baked and the amount of flour used
2. The number of mailboxes and the number of firefighters in a city
3. The cost of a family’s vacation and the size of their house
4. The time spent exercising and the number of Calories burned