# P.S. #9.1 – Scatterplots and Lines of Best Fit

Name _____ Class _____

1.) What is the difference between qualitative and quantitative data?

Qualitative - based on description
Quantitative - based on numbers

2.) Are scatter plots an example of qualitative or quantitative bivariate data? Explain how you know.

Quantitative bivariate - maps 2 sets of numerical data

3.) The table below shows the number of hours students spent listening to music last week and their scores on last week's pop math quiz out of a possible 50 points.

| Hours of Music | 9 | 3 | 5 | 2 | 7 | 1 | 1 | 3 | 8 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Math Score | 24 | 20 | 50 | 35 | 18 | 40 | 10 | 30 | 25 | 15 |
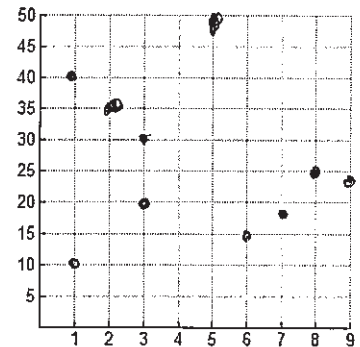
a.) Prepare a scatter plot of the data

✓

b.) What type of correlation appears to exist between this data?

No correlation

c.) Does it appear that listening to music influenced the math scores? **No**
Explain.

There is no correlation!

4.) A scatter plot was constructed as shown at the right, and a line of best fit was drawn. Which of the following choices is the equation of this line of best fit?
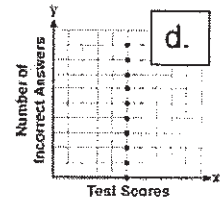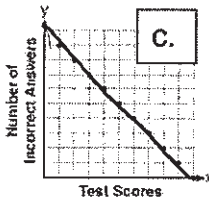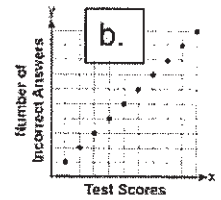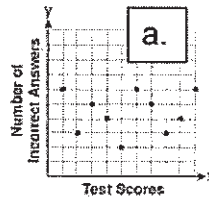
a.) $y = 5x + 5$      Explain how you decided upon

b.) $y = x + 25$       your choice:

c.) $y = x + 5$

d.) $y = 5x + 25$
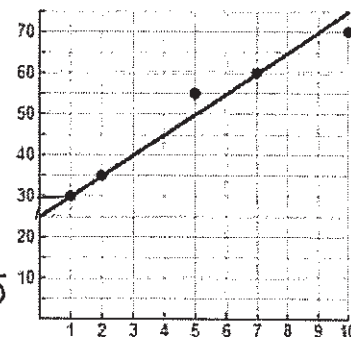
$m = \dfrac{5}{1} = 5$

$b = 25$

5.) A scatter plot is prepared to show the relationship between $x$ and $y$ where $x$ represents the score on a test and $y$ represents the number of incorrect answers a student received on a test.

   a.) Which of the choices is the correct scatter plot for this situation?

   C

   b.) What type of correlation is exhibited by the graph of this situation?

   negative

   c.) Sketch the line of best fit on the chosen graph.

   d.) Is the slope of the line of best fit positive, negative, zero, or does not exist?

   negative



   e.) Does the slope of the line agree with the type of correlation listed in part b? Explain.

   Yes - the line is going down

6.) The school bowling teams are returning home from a competition. The students are wondering if the number of peanuts eaten by each team member influenced the respective bowling scores. The data is graphed below. Which of the following conclusions about the scatter plot is valid?

   a.) Students who eat more peanuts have higher bowling scores.
   b.) Students who eat more peanuts have lower bowling scores.
   c.) Students who eat fewer peanuts have higher bowling scores.
   d.) There is almost no relationship between eating peanuts and bowling scores.
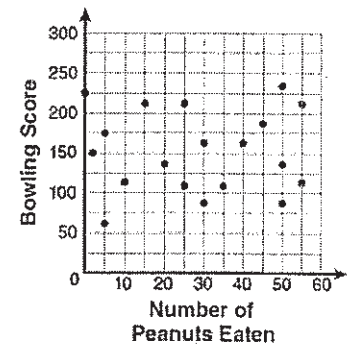
   Explain how you made your choice:

   It's scattered



7.) The four tables below show relationships in which the $x$ values represent inputs and the $y$ values represent the corresponding outputs. Which table represents a relationship that is **not** a function? Explain your reasoning.

| Q | | R | | S | | T | |
|---|---|---|---|---|---|---|---|
| $x$ | $y$ | $x$ | $y$ | $x$ | $y$ | $x$ | $y$ |
| −2 | −3 | −1 | −5 | −2 | 3 | 3 | 4 |
| 1 | 3 | 2 | 4 | 1 | 3 | 4 | 5 |
| 3 | −3 | 3 | 7 | 3 | 3 | 3 | −4 |
| 5 | 3 | 4 | 10 | 5 | 3 | 4 | −5 |

The input of 3 has more than 1 output.

2

8.) The scatter plot shows the ages of eight cows (in years) and their milk production (in gallons) per week.
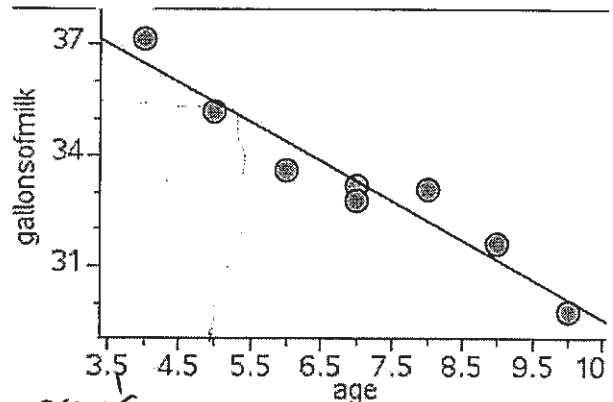
a.) Which type of correlation exists for this data?

i. positive linear correlation

ii. negative linear correlation *(circled)*

iii. no linear correlation

b.) The equation of the line of best fit is $y = -1.07x + 40.79$. What is the slope of the line of best fit telling us?

$$m = \frac{\Delta y}{\Delta x} = \frac{-1.07 \, g}{1 \, yr.}$$

Every time a cows age increases by 1 year, its weekly milk production decreases by 1.07 g.

c.) What is the y-intercept telling us?

i. We can predict cows of age 3 to produce over 40 gallons of milk a week.

ii. We can predict cows of age 1 to produce over 40 gallons of milk a week.

iii. It is not telling us anything. Cows of age 0 do not produce milk. *(circled)*

d.) Use the equation to predict how many gallons of milk a cow of age 5 tends to produce. Is this an example of interpolation or extrapolation?

$$y = -1.07(5) + 40.79$$
$$y = -5.35 + 40.79 = \boxed{35.44 \, g}$$

Interpolation

e.) Use the equation to predict how many gallons of milk a cow of age 14 tends to produce. Is this an example of interpolation or extrapolation?

$$y = -1.07(14) + 40.79$$
$$y = -14.98 + 40.79 = \boxed{25.81 \, g}$$

Extrapolation

9.) Which phrase describes a nonlinear function?

a.) the area of a circle as a function of the radius $A = \pi r^2$ *(circled)*

b.) the perimeter of a square as a function of the side length

c.) the cost of gasoline as a function of the number of gallons produced

d.) the distance traveled by a car moving at constant speed as a function of time

10.) Find the equation of a line that passes through (0,4) and (3,2).
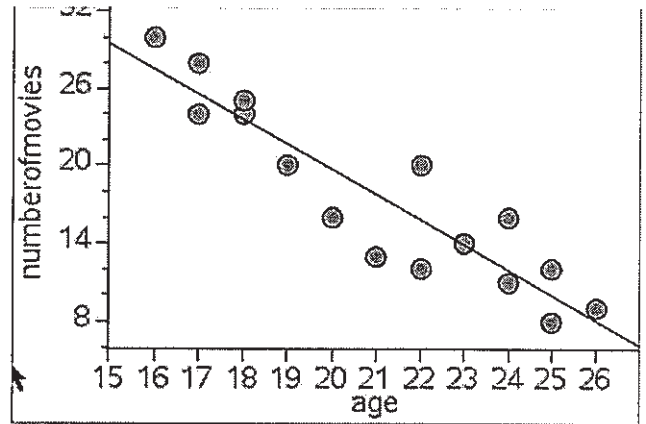
$$m = \frac{2-4}{3-0} = -\frac{2}{3}$$

$b = 4$

$$\boxed{y = -\frac{2}{3}x + 4}$$

11.) A survey of 16 shoppers at a mall were tallied to show their ages (in years) and the number of movies they saw over the past year.

a.) Which type of correlation exists for this data?

**negative linear**

b.) The equation for the line of best fit is $y = -1.94x + 30$. What is the slope of the line telling us?

$m = \dfrac{\Delta y}{\Delta x} = \dfrac{-1.94 \text{ movies}}{1 \text{ yr}}$

The # of movies a person sees goes down by about 2 movies. every yr. the get older

c.) Using the equation, predict the number of movies that would be seen in one year by a 9 year old. Is this interpolation or extrapolation?

$y = -1.94(9) + 30$

$-17.46 + 30 = 12.54 \approx$ **13 movies**

12.) Solve the equation below.

$$0.3\left(4x + \frac{1}{3}\right) = 2\left[0.4x + (-5)\right] - 7$$

$1.2x + 0.1 = 0.8x - 10 - 7$

$1.2x + 0.1 = 0.8x - 17$

$0.4x + 0.1 = -17$

$0.4x = -17.1$

$x = -42.75$