NOTES: Scatter plots and line of best fit

Kim works as waitress. Below is a table of how many tables she works and what she makes in tips

Tables	0	2	6	10	12	13	15
Amount in tips	0	13	42	65	78	92	102

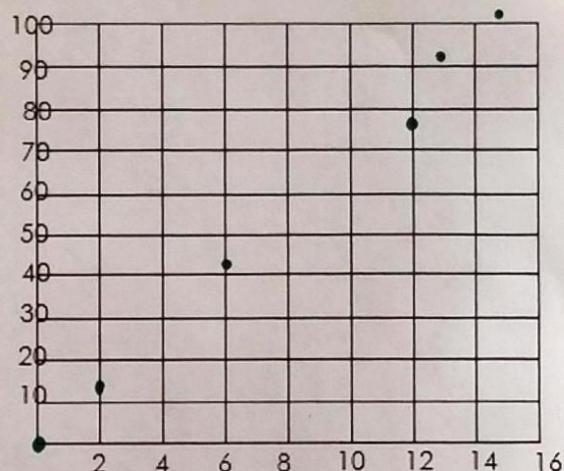1) Do you think the relationship is a correlation or a causation? Why? **CAUSATION. THE MORE TABLES SHE SERVES HAS A DIRECT RELATIONSHIP ON THE AMOUNT OF TIPS SHE GETS**

2) Do you think there is a positive or negative correlation coefficient? Why? **positive, the more she works the more she will make**

3) Graph the function, what kind of graph is this? **LINEAR (Scatter plot)**

4) Can you predict how much money Kim will make in tips if she served 22 tables?

a is the same as m

Line of best fit: the linear equation $y = ax + b$ that matches a line to a scatter plot as close as possible.

Calculator Steps:
1) Go to [data]. If needed clear out the previous data by pressing [data] and second time and pressing enter on whichever list you want to clear
2) Enter all the x values into L1 and all the y values into L2
3) Go to [stat-reg/distr]. You can do this by pressing [2nd] [data]
4) Select 2-Var stats (because we now have 2 variables)
5) Scroll down to find the variables you need

a	b	r	$\bar{x}, \bar{y}$
m (slope) *rate of change* How y changes for every x	y-intercept (starting value)	Correlation coefficient	the mean (of either x or y)

5) What is the line of best fit for Kim's waitressing variables?

$$y = 6.80x - .32$$

6) What is the correlation coefficient?

$$r = .998$$

7) Based on your correlation coefficient is this a strong or a weak model? Would it make a good predictor? Why or why not? **Strong! yes because the correlation coefficient is very close to 1**

8) Using the line of best fit model, how much money would you predict that Kim would make if she served 22 tables?

$$y = 6.80(22) - .32 \qquad \boxed{\$149.28}$$

An old myth says 1 dog year equals 7 human years, but that comparison is not accurate. An approximate comparison of ages is shown in the table:

Age of Cat or Dog (in years)	3 months (.25 years)	6 months (.5 years)	1	2	4	6	8	10	14	18	20	21
Approximate Equivalent Human age (in years)	5	10	15	24	32	40	48	56	72	90	94	101

1. Use your calculator to determine the regression formula

$$y = 4.32x + 11.20$$

2. What is the correlation coefficient?

$$r = .995$$

3. Using your equation, determine the equivalent age of the animal who is: *x -variable, Plug in for x*
   a. (Dog) 12 years old

   $$y = 4.32(12) + 11.20$$

   $$\boxed{63.04 \text{ years!}}$$

   b. (Cat) 16 years old

   $$y = 4.32(16) + 11.20$$

   $$\boxed{80.32 \text{ years!}}$$

4. Using your equation, how old would a cat or dog have to be to have the maturity of a human who is: *Human years are the y-variable. plug in for y and solve*
   a. 65 years old

   $$65 = 4.32x + 11.20$$
   $$-11.20 \qquad -11.20$$
   $$\frac{53.8}{4.32} = \frac{4.32x}{4.32} \quad \boxed{12.5 \text{ years}}$$

   b. 78 years old

   $$78 = 4.32x + 11.20$$
   $$-11.20 \qquad -11.20$$
   $$\frac{66.8}{4.32} = \frac{4.32x}{4.32} \quad \boxed{x = 15.5 \text{ years}}$$

5. The documented world's oldest dog was named Bluey from Australia who died when he was 29 years and 6 months old. Find Bluey's approximate equivalent human age.

   $$y = 4.32(29.5) + 11.20$$

   $$\boxed{y = 138.64 \text{ years old!}}$$