

Regression Practice Problems

1. A researcher wants to know if there is a relationship between the number of shopping centers in a state and the retail sales (in billions \$) of that state. A random sample of 8 states is listed below.

State	Number of stores	Sales (in billions)
GA	630	15.5
AL	370	7.5
VA	616	13.9
CA	700	18.7
FL	430	8.2
MS	568	13.2
NY	1200	23.0
CA	2976	87.3

- a. What is the equation of the regression line?  
 $y = 0.03x - 3.1$
- b. Find the correlation coefficient (r).  $r = 0.98$
- c. Describe the regression line.  
 Shape: linear  
 Direction: positive  
 Strength: strong
- d. Use the regression line to predict the sales for a state with 900 stores.  
 $y = 0.03(900) - 3.1 = \$23.9 \text{ billion}$

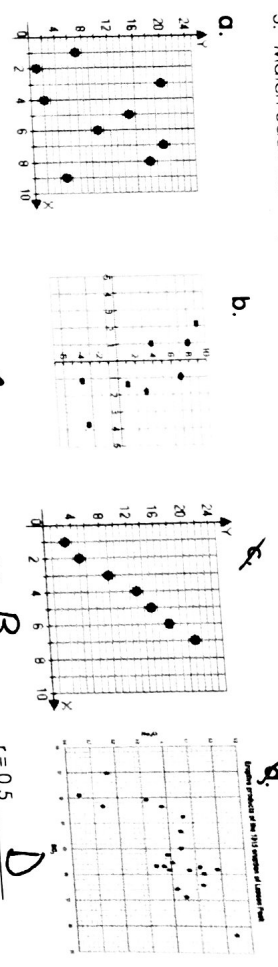
2. A pharmaceutical company is investigating the relationship between advertising expenditures and the sales of some over-the-counter (OTC) drugs. The following data represents a sample of 10 common OTC drugs. Find the equation of the regression line, using Advertising dollars as the explanatory variable and Sales as the response variable.

Advertising Dollars (in millions)	Sales (in millions)
22	64
25	74
29	82
35	90
38	100
42	120
46	120
52	142
65	180
88	230

- a. What is the equation of the regression line?  
 $y = 2.57x + 6.63$
- b. Find the correlation coefficient (r).  $r = 0.996$
- c. Describe the regression line.  
 Shape: linear  
 Direction: positive  
 Strength: strong
- d. Use the regression line to predict the sales for a state with 100 million in advertising expenses.

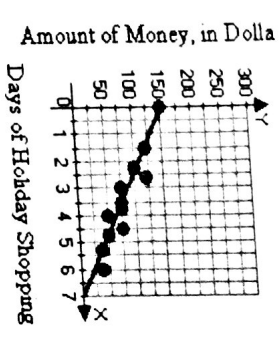
$$y = 2.57(100) + 6.63 = \$263.63 \text{ million}$$

3. Match each scatter plot below to the appropriate correlation coefficient.



- a.  $r = 0.9$  C
- b.  $r = 0$  A
- c.  $r = -0.5$  B
- d.  $r = 0.5$  D

4. The scatter plot below shows the money (Y) Jaime has after x days of holiday shopping. Does this show positive correlation?  
No - negative



5. What is the best estimate of the graph's correlation coefficient?  
 a. 0.8 b. -0.8 c. 0.2 d. -0.2

Years since 1990	4	5	6	7	8	9	10
Minimum Wage (\$)	4.15	4.20	4.30	5.15	5.25	5.25	5.75

6. Every Year since 1990, minimum wage has been raised to meet the needs of workers.
- a. What is the equation of the regression line?  
 $y = 0.28x + 2.9$
- b. Find the correlation coefficient (r).  $r = 0.95$
- c. Describe the regression line.  
 Shape: linear  
 Direction: positive  
 Strength: strong
- d. Use your equation to predict the minimum wage in year 2010 (20 yrs since 1990).  
 $y = 0.28(20) + 2.9 = \$8.50$

- e. If the minimum wage is \$10, what year is it?

$$10 = 0.28x + 2.9$$

$$-2.9$$

$$\frac{7.1}{0.28} = \frac{0.28x}{0.28}$$

7. Below is the amount of sodium in several popular pizzas and how much the entire pizza weighs. A researcher believes that there is a relationship between the 2 variables.

Brand	Sodium (mg)	Weight (g)
Pizza Hut Pan Pizza	520	95
Pizza Hut Thin N' Crispy	540	75
Pizza Hut Hand Tossed	550	92
Dominio's Thin Crust	240	55
Dominio's Deep Dish	530	95
Dominio's Hand Tossed	360	82
Papa John's Original Crust	510	91
Papa John's Pan Crust	750	146

a. What is the equation of the regression line?

$$y = 0.15x + 14.1$$

b. Find the correlation coefficient (r).  $r = 0.88$

c. Describe the regression line.

Shape: linear  
 Direction: positive  
 Strength: strong

d. If Chicago deep dish pizza has 900 mg of sodium, how much does the pizza weigh?

$$y = 0.15(900) + 14.1 = 149.1 \text{ g}$$

e. If a pizza weighs 100 grams, how much sodium is in the pizza?

$$100 = 0.15x + 14.1 \quad x = 572.67 \text{ mg}$$

8. Weight is the (explanatory / response) variable and sodium is the (explanatory / response) variable.

9. If pepperoni is added to each slice, then the weight increases by 40 grams and the sodium content increases by 140 milligrams. Which of the values would change?

- Correlation (r)       Slope (m)       y intercept (b)