

2-2 Linear Regression

Exercises

1. The table gives the number of CDs sold at certain prices for a given online music store during December.

Price (x)	\$8.99	\$10.99	\$11.99	\$12.99	\$13.99	\$14.99
Number of CDs Sold	6,456	6,009	5,345	4,560	4,100	3,231

- a. Find the correlation coefficient for the data. Round to the nearest hundredth. Interpret the correlation coefficient.
- b. Find the equation of the regression line. Round to the nearest thousandth.
- c. What is the slope of the regression line, rounded to the nearest thousandth?
- d. What are the units of the slope?
- e. If the price of CDs was raised to \$17.99, predict the number of CDs that would be sold. Round to the nearest hundred.
2. Over the past twenty years, Elisa has noticed that as the price of gasoline increased, her medical bills also increased. She found that the correlation coefficient was $r = 0.89$. Do you think this high correlation is due to causation? Explain.
3. Find the linear regression line for a scatterplot formed by the points (10, 261), (21, 252), (42, 209), (33, 163), and (52, 98). Round to the nearest tenth.
4. On a sheet of graph paper, draw a coordinate plane that shows mainly Quadrant I. Graph the points (1, 2), (4, 6), (5, 9), (6, 14), (8, 18), and (9, 19).
- a. Sketch, by eye only, your best approximation for the linear regression line. Approximate the y -intercept of your line. Approximate the slope of your line.
- b. Use your calculator to plot the regression line. Find the equation of the regression line. Round to the nearest hundredth. Compare the actual regression line to the line you drew in part a.
- c. Describe the correlation shown in the scatterplot. Find the correlation coefficient r for the data. Round to the nearest hundredth.

5. The table gives the amount raised by Key Club members and the number of Key Club t-shirts sold at Meadow East High School for given years.

Year	2006	2007	2008	2009	2010
Money Raised	\$7,456	\$7,988	\$8,322	\$8,344	\$8,901
Shirts Sold	34	40	50	41	82

- Draw a scatterplot on your calculator comparing money raised and shirts sold.
 - Find the regression line equation correct to seven decimal places, and plot it on your scatterplot.
 - Find the average amount raised over the five years shown. Assign the value to r . Find the average number of shirts sold over the five years shown. Assign the value to s .
 - Substitute the point (r, s) into the regression equation from part b to show that this point satisfies the equation.
 - Add the point (r, s) to the list of the five points you originally entered on your calculator. Compute a new regression line based on the six points you have plotted. Compare it to the original regression line you found in part b. How do they differ?
 - Describe the correlation between the amount of money raised and the number of shirts sold. Find the correlation coefficient r for the data.
6. Describe each of the following correlation coefficients using the terms strong, moderate, weak, positive, and negative.
- $r = 0.91$
 - $r = -0.57$
 - $r = -0.9$
 - $r = -0.25$
 - $r = 0.099999$
 - $r = -0.198$
7. Kaitlyn has sold Girl Scout cookies for the past four years. She kept data on her sales, as shown in the table. She is planning to sell again this year and plans on visiting 200 homes. Predict the number of boxes she would sell if she visited 200 homes. Round to the nearest ten boxes. Explain your work.

Number of Houses Visited	78	90	50	80
Number of Boxes Sold	122	135	70	119