

- g. The data were collected in Key West—not Destin, Florida. Therefore, it is not appropriate to use the linear regression equation to make predictions regarding the precipitation in Destin.
- h. The slope of the regression line indicates the amount of increase in the y -variable for each increase of one unit in the x -variable. Thus, for each degree that the temperature rises, there would be a corresponding increase of 0.225 inches of precipitation based on the model.

12.2 Section Exercises

Finding Least-Squares Regression Lines and Making Predictions

Complete the following objectives for each data set.

- a. Find the equation of the regression line if a statistically significant linear relationship exists at the 0.05 level of significance.
 - b. If a linear regression model is appropriate, use that model to make the indicated prediction.
1. a. The following table shows students' test scores on the first two tests in an introductory biology class.

Biology Test Scores												
First Test, x	55	40	71	82	90	50	83	75	65	52	77	93
Second Test, y	58	43	68	86	87	51	87	70	67	55	77	90

- b. If a student scored a 70 on his first test, make a prediction for his score on the second test.
2. a. The following table lists the birth weights (in pounds), x , and the lengths (in inches), y , for a set of newborn babies at a local hospital.

Birth Weights and Lengths										
Birth Weight (in Pounds), x	5	3	8	6	9	7	7	6	6	10
Length (in Inches), y	16	15	18	19	19	18	20	17	15	21

- b. Predict the length of an 8-pound baby.
3. a. The following table contains the number of layoffs at eight different companies over the last year and the employee satisfaction rating for each company, on a scale of 1 to 5 with 5 being the most satisfied.

Employee Satisfaction								
Number of Layoffs, x	23	22	28	35	23	25	20	25
Employee Satisfaction Rating, y	4.3	4.2	3.4	2.8	3.7	3.8	4.1	3.8

- b. For a company that laid off 21 employees, what would be the predicted employee satisfaction rating?
4. a. Students studying for a state achievement test were asked to keep track of the total number of hours that they spent playing video games during the two weeks before the test. In the following table, x is the number of hours spent playing video games (on any type of device) and y is the student's score on the achievement test (out of 130).

Hours Playing Video Games and Achievement Test Scores

Hours Playing Video Games, x	12	15	14	10	11	13	12	14
Test Score, y	99	63	79	115	108	82	98	73

- b. If a student spent 11.5 hours playing video games, predict his achievement test score.
5. a. The table shows the average per-paper circulation of the top 20 U.S. alternative weekly newspapers by circulation and the total number of newsroom employees in the newspaper sector.

Number of Newsroom Employees and Average Per-Paper Circulation

Average Per-Paper Circulation, x	87,186	79,942	72,910	65,936	61,654	55,347
Total Number of Newsroom Employees in the Newspaper Sector, y	51,430	48,920	46,310	44,120	42,450	39,210

Source: Pew Research Center. Journalism and Media. 13 June 2018. <http://www.journalism.org/fact-sheet/newspapers/> (15 Feb. 2019).

- b. How many employees might we expect in the newspaper sector if average circulation for newspapers was 75,000?
6. a. The table below is a record of the number of miles driven between stops for gas and the amount of money spent to fill up the gas tank in Evelyn's car over several months.

Miles Driven and Cost of Gasoline

Miles Driven, x	350	275	310	289	341	237	336
Cost to Fill up, y	27.30	20.79	25.74	21.11	28.66	21.33	27.58

- b. If Evelyn needs to drive 325 miles home from college, how much should she budget for gas for the trip?
7. a. The following table shows the average mathematics and science achievement test scores of eighth-grade students from 12 countries around the world.

Mathematics and Science Achievement Test Scores

Math, x	525	558	511	531	392	585	476	496	520	582	532	502
Science, y	540	535	518	533	420	569	450	538	535	530	552	515

- b. Predict the average science score for a country with an average eighth-grade math score of 570.
8. a. The following table shows the average amount of time wasted at work per day by year of birth.

Birth Years and Time Wasted per Day

Birth Year, x	1940	1955	1965	1975	1985
Time Wasted (in Hours), y	0.5	0.68	1.19	1.61	1.95

- b. Predict the amount of time that would be wasted by someone born in 1980.

Use the regression equations you calculated in the previous examples to answer the following questions.

9. Refer to exercise 3 regarding the number of layoffs and employee satisfaction rating. How does each additional layoff affect employee satisfaction?
10. Refer to exercise 4 regarding students' test scores and the number of hours spent playing video games. What is the effect on a student's test score for each additional hour playing video games?
11. Refer to exercise 5 regarding the circulation of newspapers and the number of newsroom employees. What is the effect on the number of employees for each additional 10,000 papers in circulation?
12. Refer to exercise 6 regarding Evelyn's spending on gas for her car. We are used to seeing the price of gas per gallon, and even calculating miles per gallon. However, using the regression line you calculated in exercise 6 we can look at the cost in a different way. What is the cost of gas for each additional mile driven?