

1. Several years ago, the wild rabbits of Australia were seriously threatened by a virus that was accidentally released into their population. Suppose that the following table gives the number r of rabbits (in millions) remaining t months after the release of the virus.

t (months)	2	4	6	8	10	12	14	16	18	20
r (millions)	1940	1842	1649	1328	1140	898	765	502	281	141

Use a calculator program to find the slope of the linear regression line for this data. Round to 3 decimal places.

Ans: -105.406

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

2. Several years ago, the wild rabbits of Australia were seriously threatened by a virus that was accidentally released into their population. Suppose that the following table gives the number r of rabbits (in millions) remaining t months after the release of the virus.

t (months)	2	4	6	8	10	12	14	16	18	20
r (millions)	1940	1842	1649	1328	1140	898	765	502	296	104

Use a calculator program to find the linear regression line for this data and use this to estimate how many million rabbits were left after 19 months. Round to the nearest whole number.

Ans: 198

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

3. Several years ago, the wild rabbits of Australia were seriously threatened by a virus that was accidentally released into their population. Suppose that the following table gives the number r of rabbits (in millions) remaining t months after the release of the virus.

t (months)	2	4	6	8	10	12	14	16	18	20
r (millions)	1940	1842	1649	1328	1140	898	765	502	296	104

Use a calculator program to find the linear regression line for this data. What is the physical interpretation of the t -intercept?

- A) The decrease in the population if the virus is present an additional month.
- B) The number of months the virus took to lower the population by 1 million.
- C) The initial rabbit population when the virus was introduced.
- D) The time in months at which the rabbit population falls to zero.

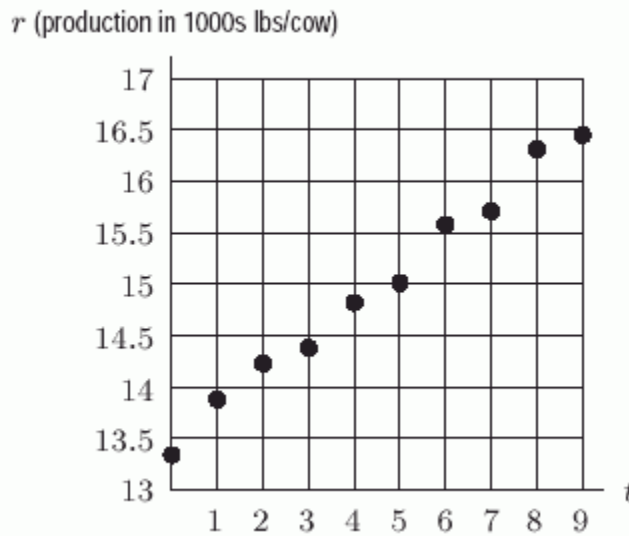
Ans: D Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

4. A study was done that collected data on 100 individuals' grade point averages and the number of hours per week they spent working. A linear regression was done on this data and the corresponding correlation coefficient was 0.3. What does this tell you about the relationship between grade point averages and working?

A) Increasing working does not affect grade point average.
 B) Increasing working increases grade point average.
 C) Increasing working decreases grade point average.

Ans: A Learning Objective: Visually estimate the correlation coefficient of a data set. difficulty: easy

5. The following figure gives the annual amount of milk produced (in 1000s of pounds) per US milk cow as a function of t , the number of years since 1986. Is the regression line $r = -0.34t + 13.4$ reasonably correct?



Ans: no

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

6. The following table shows the cost of a taxi ride, in dollars, as a function of miles traveled. Assume a linear relationship.

m	0	1	2	3	4	5
$C(m)$	0	4.00	6.50	9.00	11.50	14.00

Estimate $C(2.5)$.

Ans: 7.75

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

7. The following table shows the cost of a taxi ride, in dollars, as a function of miles traveled. Assume a linear relationship.

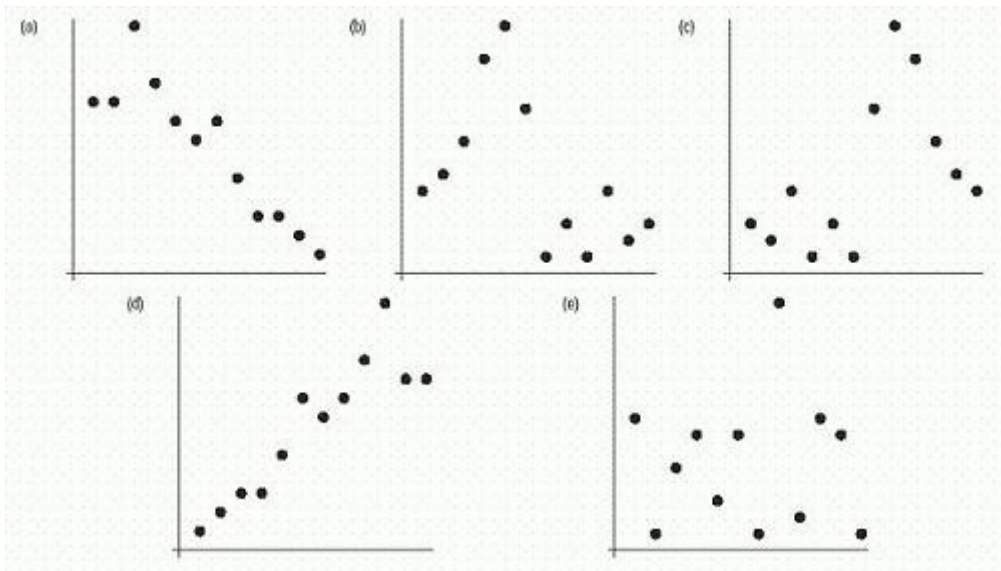
m	0	1	2	3	4	5
$C(m)$	0	4.00	5.50	7.00	8.50	10.00

If $C(m) = 9.5$, estimate m to 1 decimal place.

Ans: 4.7

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

8. The following figure shows scatter plots with r values 0.9, 0.5, 0, -0.5, and -0.9. Which scatter plot has r value 0.5?



Ans: c

Learning Objective: Visually estimate the correlation coefficient of a data set. difficulty: medium

9. The following table gives the number P of people living in a town t years after 1990.

t (years)	1	4	7	8	10	12	14	17	18	24
P	4501	4512	4590	4480	4496	4590	4610	4610	4580	4510

Use a calculator program to find the slope of the linear regression line for this data. Round to 3 decimal places.

Ans: 2.613

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: hard

10. The following table gives the number P of people living in a town t years after 1990.

t (years)	1	4	7	8	10	12	14	17	18	24
r	4501	4512	4590	4480	4496	4590	4610	4610	4580	4510

Use a calculator program to find the linear regression line for this data and use this to estimate how many lived in the year 2009. Round to the nearest whole number.

Ans: 4567

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: hard

11. The following table shows the size of a cell phone bill, in dollars, as a function of the number of text messages.

m	0	15	25	35	45	55
$C(m)$	50.00	50.00	51.25	53.75	56.25	58.75

Use a calculator program to find a linear regression line for this data. Estimate $C(37)$ using the formula for the regression line.

Ans: 54.66

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

12. The following table shows the cost of a cell phone bill, in dollars, as a function of the number of texts.

m	0	15	25	35	45	55
$C(m)$	40.00	40.00	41.50	44.50	47.50	50.50

Use a calculator program to find a linear regression line for this data. From the formula for the regression line, estimate the value of m that satisfies $C(m) = 71.50$. Round up to the nearest number of texts.

Ans: 165

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: medium

13. The following table gives the profits (in millions) of a manufacturing company t months after January 1, 2008.

t (months)	0	2	3	4	5	6	8	9	10	11
r (millions)	5.2	6.1	4.2	5.1	5.9	6.5	6.1	7.3	4.9	5.2

Use a calculator program to find the vertical intercept of the linear regression line for this data. Round to 2 decimal places.

Ans: 5.325

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions.; Visually estimate the correlation coefficient of a data set.
difficulty: hard

14. The following table gives the profits (in millions) of a manufacturing company t months after January 1, 2008.

t (months)	0	2	3	4	5	6	8	9	10	11
r (millions)	5.2	6.1	4.2	5.1	5.9	6.5	6.1	7.3	6.1	5.7

Use a calculator program to find the linear regression line for this data and use this to estimate the profit on January 1, 2009. Round your answer to one decimal place.

Ans: 6.6

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: hard

15. The following tables give the profits (in millions) of a manufacturing company t months after January 1, 2008.

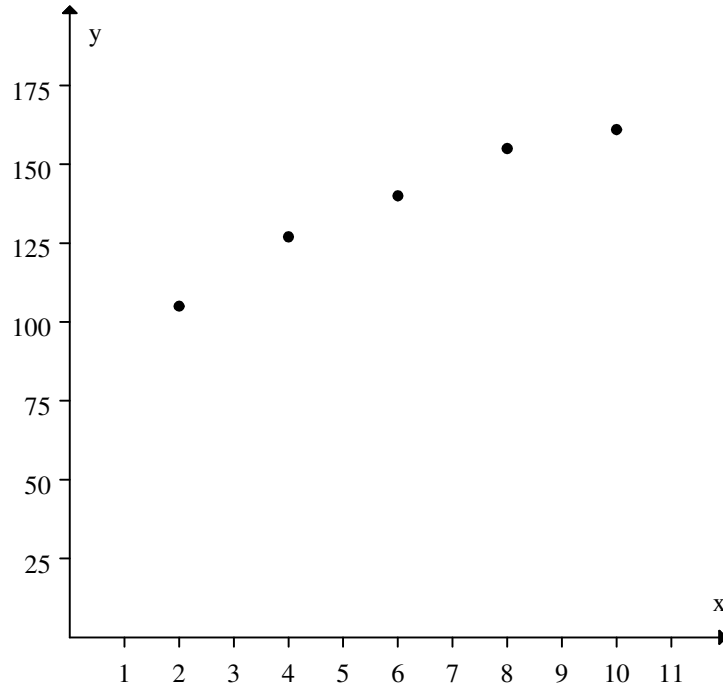
t (months)	0	2	3	4	5	6	8	9	10	11
r (millions)	5.2	6.1	4.2	5.1	5.9	6.5	6.1	7.3	6.2	5.6

Use a calculator program to find the linear regression line for this data. What is the physical interpretation of the t -intercept?

Ans: The time, in months after January 2008, at which the profit falls to zero.

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: hard

16. Does an r value of 0.03 seem reasonable for the following set of data?



Ans: No

Learning Objective: Visually estimate the correlation coefficient of a data set.

difficulty: easy

17. Several years ago, the wild rabbits of Australia were seriously threatened by a virus that was accidentally released into their population. Suppose that the following table gives the number r of rabbits (in millions) remaining t months after the release of the virus.

t (months)	2	4	6	8	10	12	14	16	18	20
r (millions)	1940	1842	1649	1328	1140	898	765	502	296	104

Find the linear regression line for this data. Round to 3 decimal places.

Ans: $y = -106.097x + 2213.467$

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions.

difficulty: hard

18. The following table gives the number of people P living in a town t years after 1990.

t (years)	1	4	7	8	10	12	14	17	18	24
r	4501	4512	4590	4480	4496	4590	4610	4610	4490	4510

Use a calculator program to find the linear regression line for this data.

Ans: $y = 1.273x + 4524.265$

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: easy

19. The following table shows the cost of a cell phone bill, in dollars, as a function of the number of texts.

m	0	15	25	35	45	55
$C(m)$	40.00	40.00	41.75	45.25	48.75	52.25

Use a calculator program to find a linear regression line for this data.

Ans: $y = 0.237m + 37.763$

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: easy

20. The following table gives the profits (in millions) of a manufacturing company t months after January 1, 2008.

t (months)	0	2	3	4	5	6	8	9	10	11
r (millions)	5.2	6.1	4.2	5.1	5.9	6.5	6.1	7.3	6.3	5.8

Use a calculator program to find the linear regression line for this data.

Ans: $y = 0.131x + 5.089$

Learning Objective: Fit a linear model to a data set, interpret the model, and use the model to make predictions. difficulty: easy