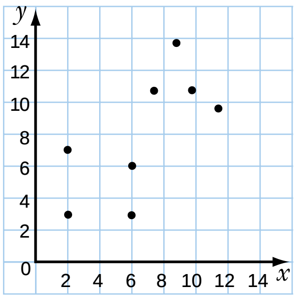
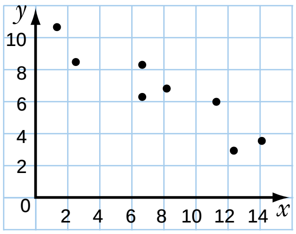
Review of Key Concepts

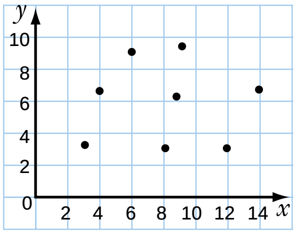
3.1 Scatter Plots and Linear Correlation

Refer to the Key Concepts on page 167.

1. a) Classify the linear correlation in each scatter plot shown below.







b) Determine the correlation coefficient for data points in the scatter plots in part a).

c) Do these correlation coefficients agree with your answers in part a)?

2. A survey of a group of randomly selected students compared the number of hours of television they watched per week with their grade averages.

Hours Per Week	12	10	5	3	15	16	8
Grade Average (%)	70	85	82	88	65	75	68

a) Create a scatter plot for these data. Classify the linear correlation.

b) Determine the correlation coefficient.

c) Can you make any conclusions about the effect that watching television has on academic achievement? Explain.

3.2 Linear Regression

Refer to the Key Concepts on page 179.

3. Use the method of least squares to find the equation for the line of best fit for the data in question 2.

4. The scores for players' first and second games at a bowling tournament are shown below.

First Game	169	150	202	230	187	177	164
Second Game	175	162	195	241	185	235	171

a) Create a scatter plot for these data.

b) Determine the correlation coefficient and the line of best fit.

c) Identify any outliers.

d) Repeat part b) with the outliers removed.

e) A player scores 250 in the first game. Use both linear models to predict this player's score for the second game. How far apart are the two predictions?

3.3 Non-Linear Regression

Refer to the Key Concepts on page 191.

5. An object is thrown straight up into the air. The table below shows the height of the object as it ascends.

Time (s)	0	0.1	0.2	0.3	0.4	0.5	0.6
Height (m)	0	1	1.8	2.6	3.2	3.8	4.2

a) Create a scatter plot for these data.

b) Perform a non-linear regression for these data. Record the equation of the curve of best fit and the coefficient of determination.

c) Use your model to predict the maximum height of the object.

d) Use your model to predict how long the object will be in the air.

e) Do you think that your model is accurate? Explain.

6. The table shows the distance travelled by a car as a function of time.

Time (s)	Distance (m)
0	0
2	6
4	22
6	50
8	90
10	140
12	190
14	240
16	290
18	340
20	380
22	410
24	430
26	440
28	440

a) Determine a curve of best fit to model the data.

b) Do you think the equation for this curve of best fit is a good model for the situation? Explain your reasoning.

c) Describe what the driver did between 0 and 28 s.

3.4 Cause and Effect

Refer to the Key Concepts on page 199.

7. Define or explain the following terms and provide an example of each one.

a) common-cause factor

b) reverse cause-and-effect relationship

c) extraneous variable

8. a) Explain the relationship between experimental and control groups.

b) Why is a control group needed in some statistical studies?

9. a) Explain the difference between an accidental relationship and a presumed relationship.

b) Provide an example of each.

10. The price of eggs is positively correlated with wages. Explain why you cannot conclude that raising the price of eggs should produce a raise in pay.

11. An educational researcher compiles data on Internet use and scholastic achievement for a random selection of students, and observes a strong positive linear correlation. She concludes that Internet use improves student grades. Comment on the validity of this conclusion.

3.5 Critical Analysis

Refer to the Key Cconcepts on page 209.

12. A teacher is trying to determine whether a new spelling game enhances learning. In his gifted class, he finds a strong positive correlation between use of the game and spelling-test scores. Should the teacher recommend the use of the game in all English classes at his school? Explain your answer.

13. a) Explain what is meant by the term *hidden variable*.

b) Explain how you might detect the presence of a hidden variable in a set of data.