15. $r = 0.561$. Critical values: $r = \pm 0.632$. P-value $= 0.091$. There is not sufficient evidence to support the claim that there is a linear correlation between enrollment and burglaries. The results do not change if the actual enrollments are listed as 32,000, 31,000, 53,000, and so on.
17. $r = 0.864$. Critical values: $r = \pm 0.666$. P-value $= 0.003$. There is sufficient evidence to support the claim that there is a linear correlation between court incomes and justice salaries. The correlation does not imply that court incomes directly affect justice s alaries, but it does appear that justices might profit by levying larger fines, or perhaps justices with higher salaries impose larger fines.
19. $r = 1.000$. Critical values: $r = \pm 0.811$. P-value $= 0.000$. There is sufficient evidence to support the claim that there is a linear correlation between amounts of redshift and distances to clusters of galaxies. Because the linear correlation coefficient is 1.000, it appears that the distances can be directly computed from the amounts of redshift.
21. $r = 0.948$. Critical values: $r = \pm 0.811$. P-value $= 0.004$. There is sufficient evidence to support the claim of a linear correlation between the overhead width of a seal in a photograph and the weight of a seal.
23. $r = 0.867$. Critical values: $r = \pm 0.878$. P-value $= 0.057$. There is not sufficient evidence to support the claim of a linear correlation between the systolic blood pressure measurements of the right and left arm.
25. $r = 0.197$. Critical values: $r = \pm 0.707$. P-value $= 0.640$. There is not sufficient evidence to support the claim that there is a linear correlation between prices of regular gas and prices of premium gas. Because there does not appear to be a linear correlation between prices of regular and premium gas, knowing the price of regular gas is not very helpful in getting a good sense for the price of premium gas.
27. $r = 1.000$. Critical values: $r = \pm 0.707$. P-value $= 0.000$. There is sufficient evidence to support the claim that there is a linear correlation between diameters and circumferences. A scatterplot confirms that there is a *linear* association between diameters and volumes.
29. $r = -0.063$. Critical values: $r = \pm 0.444$. P-value $= 0.791$. There is not sufficient evidence to support the claim of a linear correlation between IQ and brain volume.
31. $r = 0.319$. Critical values: $r = \pm 0.254$ (approximately) (Tech: ± 0.263). P-value $= 0.017$. There is sufficient evidence to support the claim of a linear correlation between the numbers of words spoken by men and women who are in couple relationships.
33. a. 0.911 b. 0.787
    c. 0.9999 (largest) d. 0.976
    e. −0.948

Section 10-3

1. The symbol $\hat{y}$ represents the predicted pulse rate. The predictor variable represents height. The response variable represents pulse rate.
3. If r is positive, the regression line has a positive slope and rises from left to right. If r is negative, the slope of the regression line is negative and it falls from left to right.
5. The best predicted time for an interval after the eruption is 69.0 min.
7. The best predicted height is $\bar{y} = 68.0$ in.
9. $\hat{y} = 3.00 + 0.500x$. The data have a pattern that is not a straight line.
11. a. $\hat{y} = 0.264 + 0.906x$
    b. $\hat{y} = 2 + 0x$ (or $\hat{y} = 2$)
    c. The results are very different, indicating that one point can dramatically affect the regression equation.
13. $\hat{y} = 16.5 - 0.00282x$; best predicted value is 15.1 fatalities per 100,000 population.
15. $\hat{y} = -36.8 + 3.47x$; best predicted value is $\bar{y} = 87.7$ burglaries. The predicted value is not close to the actual value of 329 burglaries.
17. $\hat{y} = 27.7 + 0.0373x$; best predicted value is \$30,800. The predicted value is not very close to the actual salary of \$26,088.
19. $\hat{y} = -0.00440 + 14.0x$; best predicted value is 0.172 billion light-years. The predicted value is very close to the actual distance of 0.18 light-years.
21. $\hat{y} = -157 + 40.2x$; best predicted weight is −76.6 kg (Tech: −76.5 kg). That prediction is a negative weight that cannot be correct. The overhead width of 2 cm is well beyond the scope of the available sample widths, so the extrapolation might be off by a considerable amount.
23. $\hat{y} = 43.6 + 1.31x$; best predicted value is $\bar{y} = 163.2$ mm Hg.
25. $\hat{y} = 2.57 + 0.172x$; best predicted value is $\bar{y} = \$3.05$. The predicted price is not very close to the actual price of \$2.93.
27. $\hat{y} = -0.00396 + 3.14x$; best predicted value is 4.7 cm. Even though the diameter of 1.50 cm is beyond the scope of the sample diameters, the predicted value yields the actual circumference.
29. $\hat{y} = 109 - 0.00670x$; best predicted IQ score is $\bar{y} = 101$.
31. $\hat{y} = 13{,}400 + 0.302x$; best predicted value is 16,400 (Tech: 16,458).
33. With $\beta_1 = 0$, the regression line is horizontal so that different values of x result in the same y value, and there is no correlation between x and y.

Section 10-4

1. The value of $s_e = 17.5436$ cm is the standard error of estimate, which is a measure of the differences between the observed weights and the weights predicted from the regression equation. It is a measure of the variation of the sample points about the regression line.
3. The coefficient of determination is $r^2 = 0.127$. We know that 12.7% of the variation in weight is explained by the linear correlation between height and weight, and 87.3% of the variation in weight is explained by other factors and/or random variation.
5. $r^2 = 0.870$. 87.0% of the variation in waist size is explained by the linear correlation between weight and waist size, and 13.0% of the variation in waist size is explained by other factors and/or random variation.