Exercise Set #11
Answers to Odd-Numbered Exercises

11-1 (a) The response variable is $Y =$ "weight", and the explanatory variable is $X =$ "amount of biotin".

(b) The least squares line can be written as

$$wt = 191 + 1.2(btn).$$

With each increase of 1 per kilogram of feed in biotin level, the weight increases on average by about 1.2 grams.

(c) $191 + 1.2(200) = 431$ grams

(d) $191 + 1.2(150) = 371$ grams

(e) Predicting weight from a biotin level outside the range from 0 to 225 (where data was observed) would not be appropriate.

(f) With each increase of 3 per kilogram of feed in biotin level, the weight increases on average by about $(3)(1.2) = 3.6$ grams.

(g) Solve $305 = 191 + 1.2(btn)$ to find the biotin level is about 95 per kilogram.
(i) The values for the explanatory variable look like they were controlled by the experimenter.

11-3 (a) The response variable is $Y = \text{“performance time”}$, and the explanatory variable is $X = \text{“training time”}$.

(b) For training time, $\bar{x} = 30.0 \text{ hours}$
    $s_x^2 = \frac{900}{5} = 180.0$

For performance time, $\bar{y} = 4.4 \text{ minutes}$
    $s_y^2 = \frac{5.52}{5} = 1.104$

(c) $r = -0.8938$
(d) Since the correlation is close to $-1$, one might expect a scatter plot of this data to resemble Figure 9-1d.

(e) The least squares line can be written as $prf = 6.5 - 0.07(trn)$.

(f) The relationship appears to be linear, but it is difficult to judge because there are so few data points.

(g) $6.5 - 0.07(40) = 3.7$ minutes

(h) $6.5 - 0.07(25) = 4.75$ minutes

(i) Predicting performance time from a training time outside the range from 15 to 45 minutes (where data was observed) would not be appropriate.

(j) With each increase of 1.5 hours in training time, the performance time decreases on average by about $(1.5)(0.07) = 0.105$ minutes.
11-3 - continued
(k) Solve $4 = 6.5 - 0.07(trn)$ to find the training time is about 35.7 hours.

(l) The values for the explanatory variable look like they were controlled by the experimenter.

11-5 The number of observations made $n$ is needed in order to decide how significant a correlation of $r = +0.9327$ really is.

11-7 Using a least squares line with time series data to make predictions for the future is usually not very accurate, because quantitative variables almost always change over time in a non-linear fashion.

11-9 (a) This will most likely be a bell-shaped distribution, since one expects many males to have heights relatively close to each other, and only a few males with relatively small heights or relatively large heights.

(b) This will and most likely be a bimodal distribution with male heights clustered around one value and female heights clustered around a smaller value.