Learning outcomes: Chapter 7

- 1. You should know how to draw, and interpret, a scatter diagram for pairs of variables $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$; you should be able to comment on the *strength* and *direction* of any relationship revealed by the plot.
- **2.** You should be able to calculate the quantities S_{xx} , S_{yy} and S_{xy} .
- **3.** You should be able to calculate, and interpret, the *correlation coefficient*.
- 4. You should be able to test the significance of the correlation coefficient by testing the null hypothesis $H_0: \rho = 0$, where ρ is the *population* correlation coefficient.
- 5. You should understand the simple linear regression model

$$Y = \beta_0 + \beta_1 X + \epsilon_1$$

and be able to obtain estimates of the intercept and gradient, $\hat{\beta}_0$ and $\hat{\beta}_1$, respectively.

- 6. Using output from Minitab, you should be able to test the significance of the slope term β_1 by testing the null hypothesis $H_0: \beta_1 = 0$; you should understand that this results in a test of the importance of the associated predictor variable X.
- 7. You should understand the *multiple linear regression model*

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \epsilon,$$

and be able to write down the estimated regression table from Minitab output.

- 8. You should know how to check the importance of the predictor variables X_1, X_2, \ldots by using Minitab to test the hypotheses $H_0: \beta_j = 0, j = 1, 2, \ldots$, and you should understand the process of *backwards elimination*, whereby one unimportant predictor is removed from the model at a time.
- 9. You should understand the role, and be able to interpret, the R^2 statistic.
- 10. You should be able to use your estimated regression model to make predictions of the response variable (Y) given particular values of the *predictor variables* (X_1, X_2, \ldots) .
- 11. You should know the limitations of the correlation coefficient and simple/multiple linear regression models as presented in this course.