

## PROBLEMS

- 3.1** Consider the National Football League data in Table B.1.
- Fit a multiple linear regression model relating the number of games won to the team's passing yardage ( $x_2$ ), the percentage of rushing plays ( $x_7$ ), and the opponents' yards rushing ( $x_8$ ).
  - Construct the analysis-of-variance table and test for significance of regression.
  - Calculate  $t$  statistics for testing the hypotheses  $H_0: \beta_2 = 0$ ,  $H_0: \beta_7 = 0$ , and  $H_0: \beta_8 = 0$ . What conclusions can you draw about the roles the variables  $x_2$ ,  $x_7$ , and  $x_8$  play in the model?
  - Calculate  $R^2$  and  $R^2_{\text{Adj}}$  for this model.
  - Using the partial  $F$  test, determine the contribution of  $x_7$  to the model. How is this partial  $F$  statistic related to the  $t$  test for  $\beta_7$  calculated in part c above?
- 3.2** Using the results of Problem 3.1, show numerically that the square of the simple correlation coefficient between the observed values  $y_i$  and the fitted values  $\hat{y}_i$  equals  $R^2$ .
- 3.3** Refer to Problem 3.1.
- Find a 95% CI on  $\beta_7$ .
  - Find a 95% CI on the mean number of games won by a team when  $x_2 = 2300$ ,  $x_7 = 56.0$ , and  $x_8 = 2100$ .