6.2 Consider again the model in Exercise 6.1. After augmenting this model with the squares and cubes of predictions $\hat{y}_i^2$ and $\hat{y}_i^3$, we obtain $SSE = 696.5357$. Use RESET to test for misspecification.

6.3* Consider the model

$$y_i = \beta_1 + x_{i2}\beta_2 + x_{i3}\beta_3 + e_i$$

and suppose that application of least squares to 20 observations on these variables yields the following results ($\widehat{\text{cov}[b]}$ denotes the estimated covariance matrix):

$$\begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} = \begin{bmatrix} 0.96587 \\ 0.69914 \\ 1.7769 \end{bmatrix}, \quad \widehat{\text{cov}[b]} = \begin{bmatrix} 0.21812 & 0.019195 & -0.050301 \\ 0.019195 & 0.048526 & -0.031223 \\ -0.050301 & -0.031223 & 0.037120 \end{bmatrix}$$

$$\hat{\sigma}^2 = 2.5193 \qquad R^2 = 0.9466$$

(a) Find the total variation, unexplained variation, and explained variation for this model.
(b) Find 95% interval estimates for β_2 and β_3.
(c) Use a t-test to test the hypothesis $H_0: \beta_2 \geq 1$ against the alternative $H_1: \beta_2 < 1$.
(d) Use your answers in part (a) to test the joint hypothesis $H_0: \beta_2 = 0, \beta_3 = 0$.
(e) Test the hypothesis $H_0: 2\beta_2 = \beta_3$.

6.4 Suppose that, from a sample of 63 observations, the least squares estimates and the corresponding estimated covariance matrix are given by

$$\begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \\ -1 \end{bmatrix}, \quad \widehat{\text{cov}[b]} = \begin{bmatrix} 3 & -2 & 1 \\ -2 & 4 & 0 \\ 1 & 0 & 3 \end{bmatrix}$$

Test each of the following hypotheses and state the conclusion:
(a) $\beta_2 = 0$.
(b) $\beta_1 + 2\beta_2 = 5$.
(c) $\beta_1 - \beta_2 + \beta_3 = 4$.

6.5 The RESET test suggests augmenting an existing model with the squares of the predictions $\hat{y}_i^2$, or their squares and cubes $(\hat{y}_i^2, \hat{y}_i^3)$. What would happen if you augmented the model with the predictions themselves $\hat{y}_i$?

6.6 Table 6.3 contains output for the two models

$$y_i = \beta_1 + \beta_2 x_i + \beta_3 w_i + e_i$$

$$y_i = \beta_1 + \beta_2 x_i + e_i$$

obtained using $N = 35$ observations. RESET tests applied to the second model yield F-values of 17.98 (for $\hat{y}_i^2$) and 8.72 (for $\hat{y}_i^2$ and $\hat{y}_i^3$). The correlation between x and w is $r_{xw} = 0.975$. Discuss the following questions:
(a) Should w_i be included in the model?
(b) What can you say about omitted-variable bias?
(c) What can you say about the existence of collinearity and its possible effect?

Table 6.3 Output for Exercise 6.6

Variable	Coefficient	Std. Error	t-value	Coefficient	Std. Error	t-value
C	3.6356	2.763	1.316	−5.8382	2.000	−2.919
X	−0.99845	1.235	−0.8085	4.1072	0.3383	12.14
W	0.49785	0.1174	4.240			