**Q:** Find the Variance-Covariance matrix of $W^{t}=\left[2Y\_{1}-Y\_{2},Y\_{1}+Y\_{2}\right]$.

**6.10.** Refer to Grocery retailer Problem 6.9.

a. Fit regression model (6.5) to the data for three predictor variables. State the estimated regression function. How are $b\_{1} , b\_{2} ,$ and $b\_{3}$ interpreted here?

b. Obtain the residuals and prepare a box plot of the residuals. What information does this plot provide?

c. Plot the residuals against $\hat{Y}, X\_{1}, X\_{2} , X\_{3}$, and $X\_{1}X\_{2}$ on separate graphs. Also prepare a normal probability plot. Interpret the plots and summarize your findings.

**6.11.** Refer to Grocery retailer Problem 6.9. Assume that regression model (6.5) for three predictor variables with independent normal error terms is appropriate.

a. Test whether there is a regression relation, using level of significance .05. State the alternatives, decision rule, and conclusion. What does your test result imply about $β\_{1}$, $β\_{2}$, and $β\_{3}$?. What is the P-value of the test?

b. Estimate $β\_{1}$ and $β\_{3}$ jointly by the Bonferroni procedure, using a 95 percent family confidence coefficient. Interpret your results.

c. Calculate the coefficient of multiple determination $R^{2}$. How is this measure interpreted here?

**6.14.** Refer to Grocery retailer Problem 6.9. Assume that regression model (6.5) for three predictor variables with independent normal error terms is appropriate. Three new shipments are to be received, each with $X\_{h1}= 282,000, X\_{h2} = 7.10,$ and $X\_{h3} = O$.

a. Obtain a 95 percent prediction interval for the mean handling time for these shipments.

**6.27.** In a small-scale regression study, the following data were obtained:

|  |  |  |
| --- | --- | --- |
| y | X1 | X2 |
| 42 | 7 | 33 |
| 33 | 4 | 41 |
| 75 | 16 | 7 |
| 28 | 3 | 49 |
| 91 | 21 | 5 |
| 55 | 8 | 31 |

Assume that regression model (6.1) with independent normal error terms is appropriate. Using matrix methods, obtain (a) **b**; (b) **e**; (c) **H**; (d) **SSR**; (e) $s^{2}\{b\}$; (f) $\hat{Y}\_{h}$ when $X\_{h1}=10, X\_{h2}=30$; (g) $s^{2}\{\hat{Y}\_{h}\}$ when$X\_{h1}=10, X\_{h2}=30$.