1). Test the following two-sided hypotheses:

a) For the equation

\[ \hat{Y} = 300.0 + 10.0X_1 + 200.0X_2 \]

\[ (1.0) \quad (25.0) \]

where standard errors are in parentheses, test the hypothesis that \( H_0 : \beta_2 = 160.0 \) vs \( H_1 : \beta_2 \neq 160.0 \) at the 5 percent level of significance.

b) For the equation

\[ \hat{Y} = 102.192 - 9075N + 0.3547P + 1.288I \]

\[ (2053) \quad (0.0727) \quad (0.543) \]

\[ t = -4.42 \quad 4.88 \quad 2.37 \]

\[ n = 33, \quad R^2 = 0.579, \]

test the hypothesis that \( H_0 : \beta_3 = 0 \) vs \( H_1 : \beta_3 \neq 0 \) at the one percent level of significance.

c) For the equation

\[ \hat{Y} = 1.30 + 4.91X_1 + 0.00123X_2 - 7.14X_3 \]

\[ (2.38) \quad (0.00922) \quad (71.38) \]

\[ t = 2.1 \quad 5.6 \quad -0.1 \]

\[ n = 10 \]

test the hypothesis that \( H_0 : \beta_2 = 0 \) vs \( H_1 : \beta_2 \neq 0 \) at the 5 percent level of significance.

2). Consider the following hypothetical equation for a sample of divorced men who failed to make at least one child support payment in the last four years (standard errors in parentheses):

\[ \hat{P}_i = 2.0 + 0.50M_i + 25.0Y_i + 0.80A_i + 3.0B_i - 0.15C_i \]

\[ (0.10) \quad (20.0) \quad (1.00) \quad (3.0) \quad (0.05) \]

where

- \( P_i \) = the number of monthly child support payments that the \( i \)th man missed in the last four years
- \( M_i \) = the number of months the \( i \)th man was unemployed in the last four years
- \( Y_i \) = the ratio of the dollar value of the average child support payment to average monthly disposable income for the \( i \)th man
- \( A_i \) = the age in years of the \( i \)th man
- \( B_i \) = the religious beliefs of the \( i \)th man (a scale of 1 to 4, with 4 being the most religious)
- \( C_i \) = the number of children the \( i \)th man has fathered
a. Your friend expects the coefficients of $M$ and $Y$ to be positive. Test these hypotheses. (Use the 5 percent level and $n = 20$.)

b. Test the hypothesis that the coefficient of $A$ is different from zero. (Use the 1 percent level and $n = 25$.)

c. Develop and test hypotheses for the coefficients of $B$ and $C$. (Use the 10 percent level and $n = 17$.)

3.) Consider the following equation estimated by Fred McChesney to determine whether the Washington Post’s Pulitzer Prize winning coverage of the Watergate political crisis of the 1970s had an effect on the newspaper’s circulation (t-scores in parentheses):

$$
\hat{C}_t = 290.10 + 0.761 J_t + 0.325 S_t + 0.058 W_t
$$

\[ t = (14.27) \quad (6.07) \quad (1.31) \]

$$
\bar{R}^2 = 0.97 \quad n = 26 \text{(annual)} \quad F = 168.05
$$

where $C_t = \text{circulation of the Post in year } t$

$J_t = \text{circulation of the Wall Street Journal in year } t$

$S_t = \text{the number of months during year } t \text{ that the Washington Star, the Post’s main local competitor at the time, did not publish}$

$W_t = \text{a dummy variable equal to 1 during years of Watergate coverage and 0 otherwise.}$

a. Develop appropriate hypotheses about the slope coefficients of this equation. (Hint: The Wall Street Journal had little coverage of Watergate and serves a much different market than does the Post. As a result, McChesney considered the Journal’s circulation to be a measure of the non-Watergate demand for newspapers.)

b. Test these hypotheses at the 5 percent level. (Hint: Note that t-scores, not standard errors, are given in parentheses. As mentioned in the chapter, not all published regression results follow our documentation format.)

c. Test the overall significance of the equation using the $F$-test (at the 1 percent level).

d. What economic conclusion can you draw about the effect of Watergate on the Post’s circulation?

4.) In 1986 Frederick Schut and Perter VanBergeijk published an article in which they attempted to see if pharmaceutical industry practiced international price discrimination by estimating a model of the prices of pharmaceuticals in a cross section of 32 countries. The authors felt that if price discrimination existed, then the coefficient of per capita income in a properly specified price equation would be strongly positive. The reason they felt that the coefficient of per capital income would measure price discrimination went as follows: the higher the ability to pay, the lower (in absolute value) the price elasticity of demand for pharmaceuticals and the higher the price a price discriminator could charge. In addition, the authors expected that prices would be higher if pharmaceutical patents were allowed and that prices would be lower if price controls existed, if competition was encouraged, or if the pharmaceutical market in a country was relatively large.
Their estimates were (standard errors in parentheses):

\[ \hat{P}_i = 38.22 + 1.43GDPN_i - 0.6CVN_i + 7.31PP_i - 15.63DPC_i - 11.381PC_i \]

\[
\begin{array}{ccccccc}
(0.21) & (0.22) & (6.12) & (6.93) & (7.16) \\
6.69 & -2.66 & 1.19 & -2.25 & -1.59 \\
\end{array}
\]

where

- \( P_i \) = the pharmaceutical price level in the \( i \)th country divided by that of the United States
- \( GDPN_i \) = per capita domestic product in the \( i \)th country divided by that of the United States
- \( CVN_i \) = per capita volume of consumption of pharmaceuticals in the \( i \)th country divided by that of the United States
- \( PP_i \) = a dummy variable equal to 1 if patents for pharmaceutical products are recognized in the \( i \)th country and equal to 0 otherwise
- \( DPC_i \) = a dummy variable equal to 1 if the \( i \)th country applied strict price controls and 0 otherwise
- \( IPC_i \) = a dummy variable equal to 1 if the \( i \)th country encouraged price competition and 0 otherwise

a. Develop and test appropriate hypotheses concerning the regression coefficients using the \( t \)-test at the 5 percent level.
b. Test the overall significance of the estimated equation using the \( F \)-test at the 5 percent level.
c. Set up 90 percent confidence intervals for each of the estimated slope coefficients.
d. Do you think Schut and VanBergeijk concluded that international price discrimination exists? Why or why not?
e. How would the estimated results have differed if the authors had not divided each country’s prices, per capita income, and per capita pharmaceutical consumption by that the United States? Explain your answer.