Worksheet week # 5

1. Thomas Brugging and David Rose estimated a regression for the annual team revenue for Major League Baseball franchises, using 78 observations (standard deviations in parentheses):

$$\widehat{R}_i = -1522.5 + \underset{(9.1)}{53.1}\, P_i + \underset{(233.6)}{1469.4}\, M_i + \underset{(1363.6)}{1322.7}\, S_i - \underset{(2255.7)}{7376.3}\, T_i \quad ,$$

where:

R_i	...	team revenue from attendance, broadcasting, and concessions (in thousands of dollars)
P_i	...	the i-th team's winning rate (their winning percentage multiplied by a thousand, 1000 = highest)
M_i	...	the population of the i-th team's metropolitan area (in millions)
S_i	...	a variable equal to 1 if the i-th team's stadium was built before 1940, 0 otherwise
T_i	...	a variable equal to 1 if the i-th team's city has two Major League Baseball teams, 0 otherwise

   (a) Test the statistical significance of the coefficients, comment on their signs.

   (b) The authors originally expected a negative coefficient for S. Their explanation for the unexpected positive sign was that teams in older stadiums have greater revenue because they are better known and have more faithful fans. Since this $\widehat{\beta}$ is just one observation from the sampling distribution of $\widehat{\beta}$'s, do you think they should have changed their expected sign?

   (c) On the other hand, Keynes reportedly said, "When I am wrong, I change my mind; what do you do?" If one $\widehat{\beta}$ lets you realize an error, shouldn't you be allowed to change your expectation?

   (d) Assume that you team is in last place with $P = 350$. According to this regression equation, would it be profitable to pay \$4 million a year to a free agent who would raise the team's winning rate (P) to 500? Be specific.

2. In 1986 Frederick Schut and Peter VanBergeijk published an article in which they attempted to see if the pharmaceutical industry practiced international price discrimination by estimation 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 capita 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:

$$\widehat{P}_i = \underset{}{38.22} + \underset{(0.21)}{1.43}\, GDPN_i - \underset{(0.22)}{0.6}\, CVN_i + \underset{(6.12)}{7.31}\, PP_i - \underset{(6.93)}{15.63}\, DPC_i - \underset{(7.16)}{11.38}\, IPC_i \quad ,$$

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 variable equal to 1 if patents for pharmaceutical products are recognized in the i-th country and equal to 0 otherwise
DPC_i	...	a variable equal to 1 if the i-th country applied strict price controls and 0 otherwise
IPC_i	...	a 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. Do you think Schut and VanBergeijk concluded that international price discrimination exists? Why or why not?

(b) Set up 90 percent confidence intervals for each of the estimated slope coefficients.