Problem 1. (2 points) Suppose we write down the following model for the final price of iPod auctions on eBay:

\[ \text{PRICE}_i = \beta_0 + \beta_1 \cdot \text{NEW}_i + \beta_2 \cdot \text{SCRATCH}_i + \beta_3 \cdot \text{PERCENT}_i + \beta_4 \cdot \text{BIDRS}_i + \varepsilon_i, \]

where \( \text{PRICE}_i \) is the final price of auction \( i \), \( \text{NEW}_i \) is a dummy variable which equals one when the iPod is new, \( \text{SCRATCH}_i \) is a dummy variable which equals one if the iPod is scratched, \( \text{PERCENT}_i \) is the percentage of positive seller feedback, and \( \text{BIDRS}_i \) is the number of bidders in the auction \( i \).

Each of the following questions has four parts, referring to each of the slope coefficients: \( \beta_1, \beta_2, \beta_3, \) and \( \beta_4 \) corresponding to the variables \( \text{NEW}_i, \text{SCRATCH}_i, \text{PERCENT}_i, \) and \( \text{BIDRS}_i \) respectively.

a. Before you collect data and run a regression, what signs do you expect for each of the slope coefficients?

b. For each coefficient, write down the hypothesis test (a null hypothesis and alternative hypothesis) corresponding to the sign you expect for each coefficient. (\textit{Hint:} these should all be one-sided tests.)

c. Using the following regression results (produced by Gretl), calculate the \( t \) statistics (the values of \( t_k \)) associated with each of the tests you wrote down above. Show your work. (Note that the actual \( t \)-statistics are omitted.)

Model 1: OLS, using observations 1-215
Dependent variable: \text{PRICE}

<table>
<thead>
<tr>
<th>coefficient</th>
<th>std. error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>\text{const}</td>
<td>82.6720</td>
<td>19.4564</td>
<td>4.249</td>
</tr>
<tr>
<td>\text{NEW}</td>
<td>55.4187</td>
<td>5.34081</td>
<td>?</td>
</tr>
<tr>
<td>\text{SCRATCH}</td>
<td>-20.9501</td>
<td>5.11555</td>
<td>?</td>
</tr>
<tr>
<td>\text{PERCENT}</td>
<td>0.277886</td>
<td>0.198099</td>
<td>?</td>
</tr>
<tr>
<td>\text{BIDRS}</td>
<td>0.633572</td>
<td>0.590534</td>
<td>?</td>
</tr>
</tbody>
</table>

Mean dependent var 120.3417 S.D. dependent var 40.62930
Sum squared resid 196257.9 S.E. of regression 30.57059
R-squared 0.444435 Adjusted R-squared 0.433853
F(4, 210) 41.99843 P-value(F) 7.50e-26
Log-likelihood -1037.851 Akaike criterion 2085.701
Schwarz criterion 2102.554 Hannan-Quinn 2092.511
d. Write down the critical values for each test using level $\alpha = 0.05$. (Use Table B-1 in the textbook. If the degrees of freedom is larger than 120, use the row for $\infty$.)

e. Which of the four tests do you reject at the 5% level?

f. Which of the tests would you reject at the 1% level? (*Hint: be sure to use the critical values for $\alpha = 0.01$.*)

g. Which of the tests would you reject at the 10% level?

h. Carry out the following test, at the 5% level, for each $k = 1, 2, 3, 4$:

\[
\begin{align*}
H_0 & : \beta_k = 0 \\
H_A & : \beta_k \neq 0
\end{align*}
\]

**Problem 2.** (1 point) Studenmund, Chapter 5, Exercise 3.

**Problem 3.** (1 point) Studenmund, Chapter 5, Exercise 8.

**Problem 4.** (1 point) Studenmund, Chapter 5, Exercise 9.