ECN 485 ASSIGNMENT 3 S.C. AHN

DUE APRIL 29 (WEDNESDAY)

1. (10 pts.) Find the first three terms of the Taylor expansion of $1/(1-x)$ at $x = 0$.

2. (20 pts. 4 pts. for each) Find the derivatives of:

(1) $y = x \bullet \exp(bx+1)$
(2) $y = x^2 \bullet \exp(2x)$
(3) $y = \ln[x(1-x)^8]$
(4) $y = \ln(\ln(x))$

3. (10 pts, 5 pts for each) Find the instantaneous rate of growth of y in each of the following.

(1) $y = 3^{2t}$ at $t = 1$.
(2) $y = \exp(t^2 + \ln(t))$ at $t = 1$.

4. (10 pts.) If the value of wine grows according to the function $V = 3e^{2\sqrt{t}}$. How long should a dealer store the wine? (Hint: The dealer wishes to maximize the present value of wine.)

5. (10 pts.) Given $y = w/z$, where $w = g(x)$ and $z = h(x)$, establish $\epsilon_{yx} = \epsilon_{wx} - \epsilon_{zx}$.

6. (10 pts.) Find the stationary value(s) of each of the following function, and determine whether they are local maxima or minima:

$$z = e^x + e^y + \exp(w^2) - 2e^w - (x + y).$$

7. (10 pts.) To answer this question, you need to study Example 2 (pp. 354-355) in the textbook. A two-product firm faces the demand and cost functions below:

$$Q_1 = 40 - 2P_1 - P_2; \qquad Q_2 = 35 - P_1 - P_2$$
$$C = Q_1^2 + 2Q_2^2 + 10 .$$

Find the output levels that satisfy the first-order condition for maximum profit.

8. (10 pts.) Show that $z = x^{1/2}y^{1/3} + y^{1/2}$ $(x, y > 0)$ is concave.

9. (10 pts.) Consider a profit maximizing competitive firm with a profit function given by:

$$\pi = pf(L,K) - wL - rK - F$$

where p is the output price, f(L,K) is the concave production function, w is the price of labor, r is the price of K, and F is fixed cost. (F is treated as an exogeneous variable.) Let L^* be the profit-maximizing labor input level. Determine $\partial L^*/\partial F$ and its sign.