Wilf Csaplar Jr.   ECON/BUSI 205   Homework #5   **Due Monday 3/20**

Place your name on the back of this sheet of paper and nowhere else. Staple your answers on the front of this sheet of paper. Failure to follow these directions will cost you 10 points. If you use double-sided printing or write on the back of scrap paper, I will give you one additional point.

Show all work for all questions.

1) (5 points) On Page 214, the book says S (which we called Q_S) = $b_0 + b_1 p_s$, where b_0, $b_1 > 0$. Economically, that cannot be correct. What is wrong with it? Why must it be wrong?

2) (5 points) Use a generic profit function $\Pi(Q) = TR(Q) - TC(Q)$ to prove the profit maximization function is the one you learned in *Principles of Microeconomics*.

3) (20 points) Suppose a monopolist's inverse demand curve is given by $P(Q) = 200 - \frac{1}{2}Q$. Their total cost curve is given by $TC(Q) = 100 + 20Q + Q^2$. Find the profit function. Use that to find the profit-maximizing output without using the equation from Question #2. Use the second derivative test to prove it is a maximum rather than a minimum.

4) (35 points) Suppose the inverse demand curve for a product is given $Q_D = 600 - 3P_D$ while the inverse supply curve is given by $Q_S = -140 + 7P_S$. And $P_D = P_S + t$. Find the equilibrium prices and quantity as a function of the tax rate. What percentage of the tax is paid by the consumer and what percentage is paid by the firms? Find the equation for total tax revenue as a function of the tax rate. (Hint: is this an excise tax or a ad valorem tax?) Find the tax rate which will maximize the government's tax revenue. Use the second derivative test to prove it is a maximum.

5) (10 points) In *Principles of Microeconomics*, we said that for a straight line demand curve, the marginal revenue curve started at the same point, but was twice as steep. We will prove that now. Suppose the inverse demand curve is given by $Q(P) = a - bP$. Find the demand curve. Use that to find the total revenue function. Use that to find the marginal revenue function. Were you taught correctly?

6) (25 points) Suppose a CD manufacturer is facing an inverse demand curve for a CD given $Q(P) = 100 - \frac{1}{4}P$. It's total cost function is given by $TC(Q) = 10 + 8Q + R(Q)$ where royalties are given by $R(Q) = .1Q*P$. Find the firm's profit function and find the profit-maximizing quantity. Find the royalty-maximizing quantity which the band would want.