ECON 321, Prof. Hogendorn

Problem Set 1

1. Do problem 2-1, pg. 61.

2. *KmartWalMart.* Suppose that Kmart and Wal-Mart both produce a composite output q which is some measure of floorspace and sales. Kmart and Wal-Mart's total cost curves are:

$$TC(q_K) = q_K \qquad TC(q_W) = 0.7q_W$$

The market demand for the composite good is

$$p(Q) = 2 - 4(q_K + q_W)$$

The firms are Cournot competitors. What is the price and what are Kmart's and Wal-Mart's market shares and profits?

Review Problem only, not to turn in:

3. Do problem 3-5, pg. 96.

Answer to Review Problem:

4. *M3-5_a.* The weighted average can be rewritten to make it more similar to the usual problem:

$$g_i = p_i q_i - (1 - \sigma) 10 q_i$$

Essentially, the firms are underweighting costs. The maximization problem for firm 1 is

$$\max_{q_1} g_i = (100 - q_1 - q_2) q_1 - (1 - \sigma) 10 q_1$$

The best response function for firm 1 is just the FOC for a payoff maximum (note it's not a profit maximum in this case):

$$\frac{\partial g_1}{\partial q_1} = 100 - q_1 - q_2 - q_1 - (1-\sigma)10 = 0 \Rightarrow q_1(q_2) = \frac{100 - q_2 - (1-\sigma)10}{2}$$

We already know that problems of this form have a solution where quantity is $\frac{a-c}{3b}$ and profit is $\frac{(a-c)^2}{9b}$. Here $a = 100$, $b = 1$, and $c = (1-\sigma)10$, so the answers are

$$q_1^* = \frac{100 - (1-\sigma)10}{3} \qquad \pi_i^* = \frac{(100 - (1-\sigma)10)^2}{9}$$

If we draw a best response diagram and compare the standard case $\sigma = 0$ with this case, we can see that the effect of σ is to shift the reaction functions to the right (up for firm 2), increasing the total amount of Cournot equilibrium quantity. Of course this actually decreases the correctly-calculated profit.