

due : Wednesday November 9    before class

Do all 5 questions. Each counts 20%.

1. What are the market price, and aggregate quantity sold, in long-run equilibrium in a perfectly competitive market for which the demand function has the equation

$$Q = \frac{6000000}{p}$$

(where  $Q$  is aggregate quantity demanded, and  $p$  the price), if there is free entry by identical firms to the industry, each of which has the long-run total cost function

$$TC = 9000q - 600q^2 + 15q^3$$

where  $q$  is the quantity produced by the firm?

2. Suppose that firms in a competitive industry were not identical. Instead, there are 10 firms each with a cost function  $TC(q) = q^2/2$ , 10 more firms each with a total cost function  $TC(q) = q + q^2/2$ , 10 more firms each with a total cost function of  $TC(q) = 2q + q^2/2$ , another 10 firms each with cost function  $TC(q) = 3q + q^2/2$ , and so on. Firms are free to enter and exit the industry. What is the equation of the long-run supply curve for the industry?

3. How would the output of a single-price monopoly vary with its fixed cost  $F$ , if it had a cost function  $C(q) = F + cq$ , and faced an inverse demand function  $p = a - bq$  (where  $a$ ,  $b$  and  $c$  are positive constants, with  $a > c$ )?

4. What is the Cournot equilibrium, if there are  $n > 1$  firms in the industry, each producing a homogeneous product, each with identical total cost function  $TC(q) = cq$  where  $c > 0$  is some constant, if the market demand function is

$$Q^D = p^{-a}$$

where  $p$  is the price of the good,  $Q^D$  the total quantity demanded, and  $a > 1/n$ ?

5. Solve for the equilibrium of a Cournot duopoly, if firms produce a homogeneous output, the demand for which obeys the function  $p = a - Q$  where  $p$  is the price of the good,  $Q = q_1 + q_2$  is the total quantity sold, and  $a > 0$ , if firm #1 could produce the good for nothing, and if firm #2 had the total cost function

$$TC(q_2) = cq_2$$

where  $a > c > 0$ .

How does the profit of firm 1 vary with its rival's marginal cost  $c$  of production?