Economics 205
UNIVERSITY OF VICTORIA
Managerial Economics
Spring 2014
Assignment #4
Solutions

Due: Friday, March 21, 2014 (3 pm.) (Place In the box marked **Econ 205** near the Economics main office.)

Question 1: The Jump-It! Company is a firm within a perfectly competitive industry. Its total cost function, like all members of the industry, is:

$TC = 648 - 32Q + 8Q^2$,

where TC is the firm's monthly total cost (in dollars), and Q is the firm's monthly output. If the industry is in long-run equilibrium, what is the price of Optimize-It's product and its monthly output?

5 Marks

Since average cost must be a minimum*:*

$$AC = \frac{648}{Q} - 32 + 8Q$$

$$\frac{\partial AC}{\partial Q} = \frac{-648}{Q^2} + 8 = 0$$

$$\frac{648}{Q^2} = 8$$

$$\frac{648}{8} = Q^2$$

$$81 = Q^2$$

Thus,

$$Q = \sqrt{81} = 9$$

and average cost

$$AC = \frac{648}{9} - 32 + 6(9)$$

$$72 - 32 + 54 = 94$$

So the price must be \$94, since in the long-run equilibrium, price equals the minimum value of average cost. Monthly output is 9 units.

Question 2: The cornstarch industry is perfectly competitive. Each case of starch contains 50,000 kgs. The minimum point along the long-run average cost curve of cornstarch producers is $11,830, and this minimum point occurs at an output of 200 cases per week. The market demand curve for these cases of cornstarch is:

$$Q_D = 850{,}625 - 25P,$$

where P is the price of starch (in dollars per case), and Q_D is the quantity of starch demanded per week. The market supply curve for starch is

$$Q_S = 22{,}525 + 45P,$$

where Q_S is the quantity of cases supplied per week.

A) What is the equilibrium price of cornstarch? Is this the long-run equilibrium price?

(2 Marks)

$Q_S = Q_D$

$22{,}525 + 45P = 850{,}625 - 25P$
$828{,}100 = 70P$
$P = 11{,}830$
$(Q = 554{,}875)$
Price is $11,830, so this must be the long run price.

B) How many firms are in this industry when it is in long-run equilibrium?

(2 Marks)

$Q_D = 850{,}625 - 25P$
$Q_D = 850{,}625 - 25(11830)$
$Q_D = 554{,}875$

Total industry demand/supply is 554,875. Since each firm produces 200 units there are 554,875/200=2774.375 firms. Approximately 2775 firms.

Question 3: Markus Connor is the owner of a Dental-laser company operating in an economy as an unregulated monopoly. After considerable research and testing, he finds that his marginal cost can be approximated by a straight line, MC=785 +9Q, where MC is marginal cost (in dollars), and Q is output. The demand curve for the product is P=5005-5.5Q, where P is the product price (in dollars) and Q is output.

a) If he wants to maximize profit, what output should he choose? ***(2 Marks)***

Total revenue is $PQ=(5005 - 5.5Q)*Q=5005Q-5.5Q^2$

So, marginal revenue is 5005-11Q=MR

and MC= 785+9Q.

The solution is determined where MR=MC and solving for Q:
5005-11Q=785+9Q
4220=20Q
Q=211

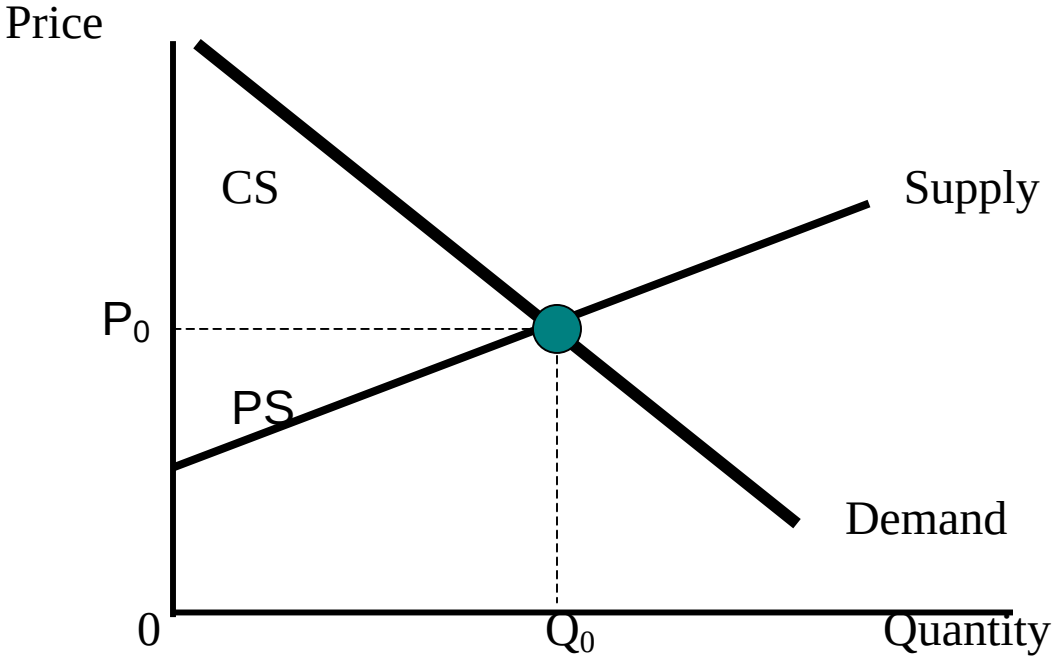
b) What price should he charge? ***(2 Marks)***
Since the demand curve is P=5005-5.5Q, price must be:
P=5005-5.5(211)=3844.50.
Thus, he should charge $3844.50.

Question 4: (6 Marks)

Explain and illustrate the effect of a per unit tax on consumer and producer surplus.

The Effect of A Per Unit Tax on Consumer and Producer Surplus

It has been shown that the behaviour of consumers and producers change when a tax is imposed. Taxes have social consequences.



Before the government imposes a per unit tax, the long-run equilibrium price and quantity in a competitive industry are P_0 and Q_0.

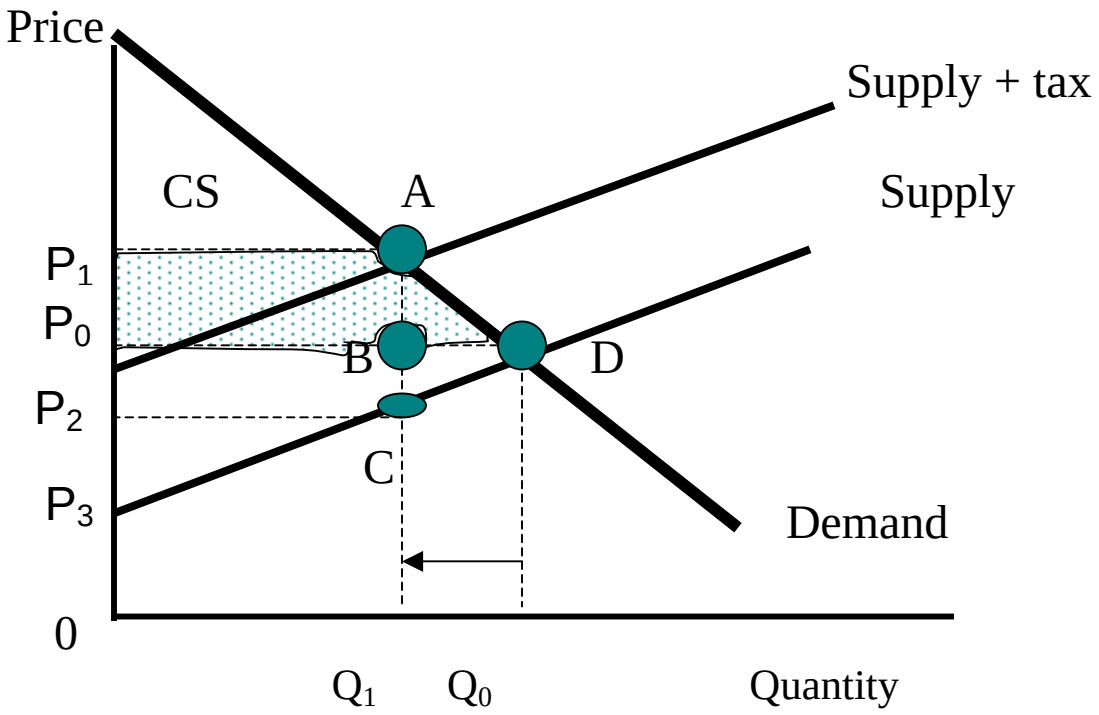
Consumers benefit because they are willing to pay more than P_0 for each unit up to the Q_0^{th} . The area between the demand curve and the price measures consumer surplus.

Producers receive P_0 for all the units they sell, even though they are willing to supply all units up to the Q_0^{th} unit at lower prices.

The area between the price line P_0 and the industry supply function represents producer surplus when producers sell Q_0 units are price P_0.

Now impose the Per Unit Tax:

The sum of consumer and producer surpluses **decreases** when the government imposes a per unit tax on a competitive industry.



The market price increases to P_1 and equilibrium quantity decreases to Q_1 when the tax is imposed.

Consumer surplus decreases by area P_0 P_1 AD.
Consumer surplus is now P_1 P_4 A.
Producer surplus in now area P_3 P_2C.

Although producers receive P_1 for Q_1 units, they must pay the government the tax of area P_2P_1 AC.

Producer surplus has decreased by area P_2P_0 DC.

Dead weight loss= ADC (loss of consumer and producer surplus that is not offset by an increase in value to some other group.

Question 5 (6 marks)
Define and explain what the market structure of Monopoly entails. Include the demand and supply curves for the firm and market, and the long-run equilibrium point of production for an individual firm.

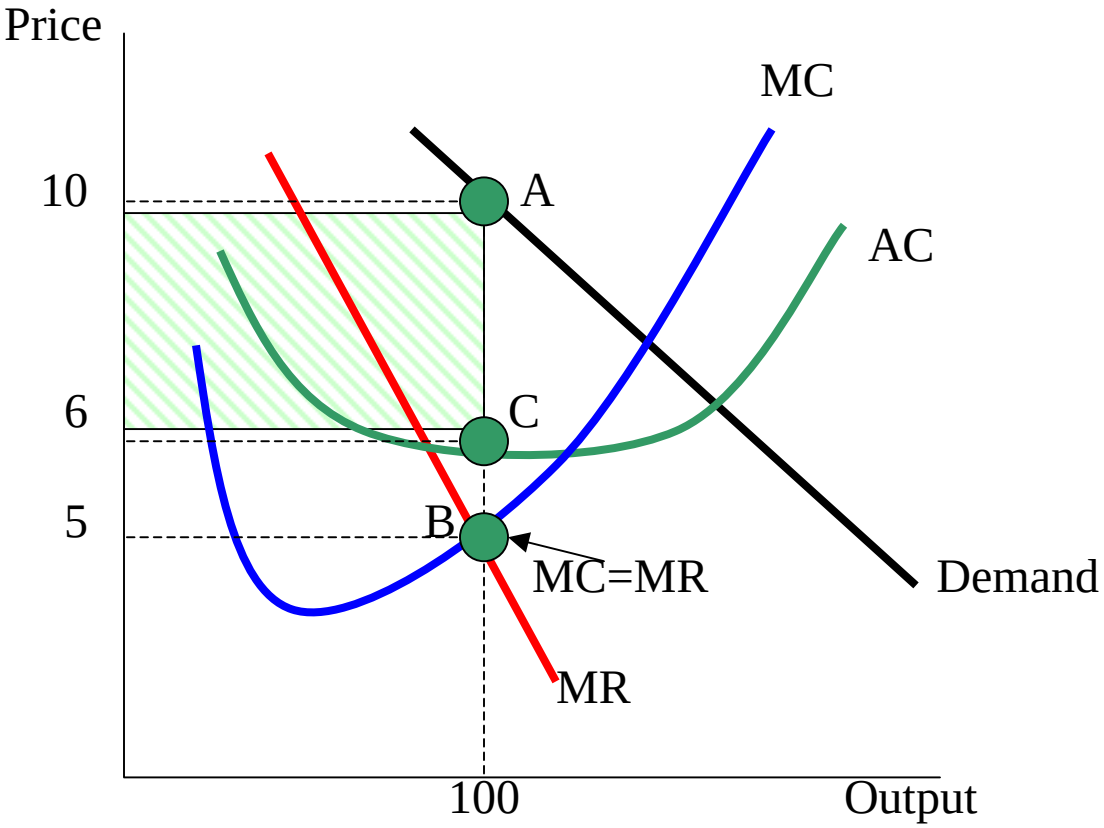
Assumptions of a Pure Monopolist:

1) Competitors cannot enter the industry
2) No close substitutes.

In order to **maximize profit**, an unregulated monopolist will choose the price and output levels at which the difference between total revenue and total cost is **largest**.

The Output and Price Decision

The price and output decision of the monopolist are shown in the figure:



Profit=10-A-C-6=(4)*(100)=400

To maximize profit, the monopolist should produce an output where MC curve intersects the MR curve.

If the monopolist produced Q=100 units, the demand curve shows that it must set a price of P=$10.

Note: Since the monopolist is the only member of the industry, the demand curve for the output of the monopolist is the industry demand curve. So, in contrast to perfect competition, where the demand curve of the individual firm is horizontal, the demand curve for the monopolists' output, slopes downward and to the right.

Most monopolized industries set a higher price and produce a lower output than in a perfectly competitive market.

This is because the perfectly competitive firm operates at the point where price equals MC, whereas the monopolist operates at a point at which price is greater than MC.

Total 25 Marks