Econ 101 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Summer 2014

Answers to Quiz #4

Please write all answers neatly and legibly.

1. Suppose that a perfectly competitive market has 100 consumers of its product and that each consumer’s demand curve is identical to all the other individual demand curves. You are provided the following information about this competitive market:

Individual Demand Curve: P = 100 – 10q where q is the quantity demanded by the individual and P is the price per unit of the good

You are also told that the representative firm in this industry has the following marginal cost and total cost functions:

Total Cost = TC = 20q + (1/6)q2 + 100

Marginal Cost = MC = 20 + (1/3)q where q is the quantity supplied by the individual firm

For this question assume all firms are identical and have the same cost curves. Also, assume there are 10 firms in the industry.

a. (2 points) What is the equation for the market demand curve in slope-intercept form? Show how you found your answer. Use Q as the market quantity and P as the price per unit.

Answer:

To find the market demand curve you must horizontally sum the individual demand curves: there are 100 individuals in this market, so that implies that the x-intercept of the market demand curve will be 100 times bigger than the x-intercept of the representative firm. Thus, the x-intercept of the market demand curve will be 1000. The y-intercept will continue to be 100 since each consumer’s demand curve is identical. Thus, we know that (0,100) and (1000,0) are points on the market demand curve. The market demand curve can be written as P = 100 – (1/10)Q.

b. (2 points) What is the equation for the market supply curve in slope-intercept form? Show how you found your answer. Use Q as the market quantity and P as the price per unit.

Answer:

We are told that there are 10 firms and that each firm has the same cost curves. To find the market supply curve we need to horizontally sum the MC curves for each of these firms. Thus, with each firm’s MC = 20 + (1/3)q , this implies that the market supply curve will have the y-intercept of 20. We need to find a second point on the market supply curve: for example, if P = 40, then the individual firm will produce 60 units of the good. If there are 10 identical firms this implies that at a price of $40 per unit, the market will supply 60\*10 or 600 units of the good. Thus, the market supply curve includes the two points (0, 20) and (600, 40). Using these two points we can write the market supply curve as P = 20 + (1/30)Q.

c. (2 points) What is the equilibrium price, P, and equilibrium market quantity, Q, in this market? For full credit show how you found your answer to this question.

Answer:

To find the equilibrium price and quantity in this market use the market demand and supply equations. Thus, 100 – (1/10)Q = 20 + (1/30)Q

80 = (4/30)Q

Q = 600 units of the good

P = 100 – (1/10)Q = 100 – (1/10)(600) = $40 per unit

Or, P = 20 + (1/30)Q = 20 + (1/30)(600) = $40 per unit

d. (2 points) What is the quantity, q, produced by the representative firm? For full credit show how you found your answer to this question.

Answer:

The representative firm is a price taker and will see the market price of $40 as its marginal revenue curve. It will profit maximize by producing that level of output where MR equals MC. Thus, 40 = 20 + (1/3)q or q = 60 units.

e. (1 point) Calculate the level of profits that the representative firm is earning. Show all your calculations in finding this answer.

Answer:

Profits for the firm are equal to total revenue (TR) minus total cost (TC). TR for a representative firm is equal to the product of price and quantity: thus, TR = ($40 per unit)(60 units) = $2400. TC for the representative firm is calculated as TC = 20q + (1/6)q2 + 100 with q = 60 units. Thus, TC = 20(60) + (1/6)(60)(60) + 100 = 1200 + 600 + 100 = $1900. Profit for the representative firm is equal to $500.

f. (1 point) Holding everything else constant, what do you predict will happen in this industry in the long run? Explain your answer fully with a verbal description rather than a numeric calculation.

Answer:

Since the representative firm is earning positive economic profit we can conclude that this is a short-run equilibrium. We know that when the industry is in a long-run equilibrium that the representative firm in the industry will earn zero economic profit. Thus, we can predict that in the long run there will be entry of new firms into this industry. This entry will cause the market supply curve to shift to the right and this shift will result in the market equilibrium quantity increasing while the market equilibrium price will decrease relative to its current levels. There will be more firms in the industry, and each firm will produce an output that is smaller than 60 units.

To find the precise number of firms in the industry we can note that the representative firm in the long run will produce where its MC = ATC. We know TC for the representative firm and we can use this to find the ATC. Thus, ATC = 20 + (1/6)q + 10/q. Setting ATC equal to MC we have:

20 + (1/6)q + 10/q = 20 + (1/3)q

10/q = (1/6)q

Or, q = 2(15)1/2

From here the math gets tedious….but you can work through this and find the market price, etc…..no need for that in this problem though.