# EconS 301 – Intermediate Microeconomics
# Review Session #7 – Chapter 9: Perfectly Competitive Markets

1. The market for sweet potatoes consists of 1,000 identical firms. Each firm has a short-run total cost curve of $STC = 100 + 100\ q + 100q^2$, and a short-run marginal cost curve of $SMC=100+200q$ where $q$ is output. Suppose that sunk costs are 75 and non-sunk costs are 25. What is the equation of an individual firm's short-run supply curve?

   a) $q = P/200 - .5$ for $P \geq 100$, and $q=0$ otherwise.

   b) $q = P/100 - .5$ for $P \geq 200$, and $q=0$ otherwise.

   c) $P = 100 + 200q$

   *d)* $q = P/200 - .5$ for $P \geq 200$, and $q=0$ otherwise.

## *Answer*

Recall that the supply curve is simply the marginal cost curve above the minimum average variable cost. So we simply have to take the given marginal cost and solve for q, treating MC=P. Also, note that the supply will be zero for a certain range of prices. Thus, the answer is A.

2. A perfectly competitive firm's short-run supply curve is determined by the equation:

   a) $P= AC$ *where* $P \geq SMC$. Otherwise, supply is zero.

   b) $P=AVC$ where $P \geq SMC$. Otherwise, supply is zero.

   c) $P=SMC$ where $P \geq AC$. Otherwise, supply is zero.

   d) $P = SMC$ where $P \geq AVC$ or $P \geq ANSC$ or $P \geq SAC$, depending on the level of sunk costs. Otherwise, supply is zero.

## *Answer*

Again, recall that the supply curve is simply the marginal cost curve above the minimum average variable cost. Thus the answer is D.

3. Which of the following is *not* true in a long-run perfectly competitive equilibrium?

   a) $P = MC$, where $P$ is market price and $MC$ is the marginal cost of a firm.

   b) $P = AC$, where $P$ is market price and $AC$ is the average cost of a firm.

   c) $Q^d = nq$, where $q$ is the supply of an individual firm, $n$ is the number of firms in the industry, and $Q^d$ is the market demand for a product.

   d) Firms may earn negative profits.

## *Answer*

Firms will not earn negative profits in a long-run equilibrium. They would simply exit the market. Thus the answer is D.

4. For an entire perfectly competitive industry, which of the following statements is *incorrect* in the long run?
   a) Economic profit for the industry equals zero.
   b) Producer surplus equals economic rent.
   c) Economic profit equals total revenues less total costs.
   d) Producer surplus for the industry equals economic profit for the industry.

### *Answer*

We know producer surplus equals economic profit, and we know in the long-run economic profit will be zero. We also know that economic rent is not zero, thus the answer is B.

5. In a perfectly competitive, increasing-cost industry in the long run, economic profit for the industry _____ and economic rent _____.
   a) can be positive; can be positive.
   b) can be positive; equals zero.
   c) equals zero; can be positive.
   d) equals zero; equals zero.

### *Answer*

We know in a perfectly competitive market, the economic profit is zero, so you can eliminate choices A and B. Also, we know that economic rent can be positive, thus the answer is C.

## *WRITTEN EXERCISES*

6. In a certain market in the long-run, each firm and potential entrant has a long-run average cost curve $AC = 10Q^2 - 5Q + 20$ and long-run marginal cost curve $MC = 30Q^2 - 10Q + 20$ where $Q$ is thousands of units per year. Market demand is given by $D(P) = 39,000 - 2,000P$.

   a) In equilibrium, how many units will each firm produce?

### *Answer*

In the long-run equilibrium, each firm will produce where $P = AC = MC$. Thus,

$$\begin{aligned} 10Q^2 - 5Q + 20 &= 30Q^2 - 10Q + 20 \\ 20Q^2 - 5Q &= 0 \\ 20Q - 5 &= 0 \\ Q &= 0.25 \end{aligned}$$

b) What is the market equilibrium price?

### *Answer*

Since each firm produces where $P = MC$, price will be

$$P = 30Q^2 - 10Q + 20$$
$$P = 30(0.25)^2 - 10(0.25) + 20$$
$$P = 19.375$$

c) What is the equilibrium number of firms in the long-run?

### *Answer*

Since total market demand is 250 and each firm is produce 0.25 units, the total number of firms in the market in equilibrium will be

$$N = \frac{250}{0.25}$$
$$N = 1,000$$

7. Suppose market demand is given by $D(P) = 25 - 0.25P$ and market supply is given by $S(P) = 0.2P - 2$.

a) What are the market equilibrium price and quantity?

### *Answer*

Setting market demand equal to market supply yields

$$25 - 0.25P = 0.2P - 2$$
$$0.45P = 27$$
$$P = 60$$

At $P = 60$, the equilibrium quantity sold will be

$$D(P) = 25 - 0.25P$$
$$D(60) = 25 - 0.25(60)$$
$$D(60) = 10$$

The equilibrium quantity is 10 units.

b) What is producer surplus at the market equilibrium?

### *Answer*

Producer surplus is given by area B in the figure above. Thus, producer surplus is $PS = 0.5(60-10)10 = 250$.

8. Suppose a firm's short-run total cost curve is given by

$$STC = 30Q^2 + 25Q + 15$$

with short-run marginal cost $SMC = 60Q + 25$.

a) What is the equation for the firm's short-run supply curve?

### *Answer*

First, we find the minimum of average variable cost by setting average variable cost equal to short-run marginal cost.

$$30Q + 25 = 60Q + 25$$
$$Q = 0$$

At $Q = 0$, average variable cost is $\text{AVC} = 30\text{Q} + 25 = 30(0) + 25 = 25$. The supply curve is the short-run marginal cost curve above the minimum point of average variable cost. Thus,

$$S(P) = \begin{cases} \dfrac{P-25}{60} & P \geq 25 \\ 0 & P < 25 \end{cases}$$