

Econ 30010
Intermediate Microeconomic Theory
Answers to Chapter 9 Problems

11. $ANSC(q) = 32/q + 2q$ and $MC(q) = 4q$ so $ANSC(q)$ is minimized at a quantity of 4 and a value of \$16. No firm will produce at a price below \$16. The supply curve for a firm is $q_s = P/4$ at any price above \$16 and zero otherwise. With 60 firms, the market supply is $Q_s = 15P$ at any price above \$16. The short-run equilibrium price must satisfy

$$400 - 5P = 15P \text{ or } P = 20.$$

13. The market supply curve is $Q_s = (100)(2P) + (30)(10P) = 500P$. Given demand curve $Q_d = 5000 - 500P$, the market-clearing price will imply $5000 - 500P = 500P$ or $P = 5$. At this price each type A firm will produce 10 units and each type B firm will produce 50 units.

15. If firms are earning zero economic profit, then each firm is producing where $AC(q)$ is minimized. This occurs at the quantity for which $AC(q) = MC(q)$ or

$$400/q + 5 + q = 5 + 2q \text{ or } q = 20.$$

$AC(20) = 45$ so the market price is \$45. The quantity demanded at a price of \$45 is $Q_d = 262.5 - 45/2 = 240$. Since each firm will produce 20 units, there must be 12 firms in the market.

29. a. In the long run, each firm will produce at the quantity for which $AC(q) = MC(q)$ or $q = 10$.

b. Since $MC(10) = 20w^{1/2}$ and since profit-maximizing firms in perfectly competitive industries choose their output levels so that $MC(q) = P$, the long-run equilibrium price must be $P = 20w^{1/2}$.

c. With $r = 1$ and $Q = 10$, $L^* = 100/w^{1/2}$.

d. $D(20w^{1/2}) = 500/w^{1/2}$

e. Since each firm will produce 10 units, there will be $50/w^{1/2}$ firms in the long-run equilibrium.

f. Multiplying the number of firms from (e) by the quantity demanded of labor by each firm from (c) implies the market demand for labor is $5000/w$.

g. Equating the quantity supplied of labor with the quantity demanded implies $5000/w = 50w$ or $w^* = 10$.

h. The equilibrium wage implies $P^* = 63.25$, market volume of 158.10, and 15 firms.

32. a. The minimum efficient scale for each firm occurs where $AC(q)$ is minimized. For average firms this occurs at the quantity for which $MC(q) = AC(q)$ or $2q = 144/q + q$ or $q = 12$. At $q = 12$, $AC(q) = 24$.
- b. The long-run equilibrium price will be determined by zero profits for average firms since there is an unlimited supply of average CEOs. The long-run equilibrium price will be 24.
- c. Each firm will produce at the quantity for which $MC(q) = 24$. Average firms will produce 12 units and exceptional firms will produce 24 units.
- d. $D(24) = 4800$
- e. The 100 exceptional firms together will produce 2400 units. This leaves 2400 units for average firms to produce. Since each average firm produces 12 units, there will be 200 average firms operating in the long-run equilibrium.
- f. Each exceptional firm would earn an economic profit of \$144,000 if it paid its manager the same as an average manager. This is the rent that accrues to the firm because of the talent of its manager.
- g. \$144,000
- h. \$288,000