

Intermediate Microeconomics
Perfect Competition Practice Problem

Suppose that a firm faces a demand curve of $D(P) = 600 - 10P$. The firm's short-run total cost curve is $STC(Q) = 49 + 2Q + Q^2$, and its marginal cost curve is $SMC(Q) = 2 + 2Q$.

1. In the short-run, there are 20 identical firms in the industry.
 - a) Find the market price, firm's quantity, and market quantity in the short-run.
 - b) Does the firm make a positive, negative, or zero profit? Find profit for the firm.
 - c) Calculate the elasticity of supply at equilibrium.

2. Is this a long-run equilibrium? Why or why not. If not, find the long-run number of firms.

ANSWERS:

1. SHORT RUN

- a) Solve SMC for Q. $P = 2 + 2Q$. $P - 2 = 2Q$. $Q_F = \frac{1}{2}P - 1$.

Multiply Q_F by the number of firms to find Q_M .

$$Q_M = 20(\frac{1}{2}P - 1) = 10P - 20.$$

Set market supply $S(P)$ equal to market demand $D(P)$.

$$10P - 20 = 600 - 10P. \quad 20P = 620.$$

$$P^* = 31$$

$$Q_F = 14.5$$

$$Q_M = 290$$

- b) Profit = TR - TC = $P^*Q - TC = 31(14.5) - [49 + 2(14.5) + 14.5^2]$
Profit = \$161.25

- c) $E_{Q^S, P} = \left(\frac{\Delta Q^S}{\Delta P} \right) \left(\frac{P}{Q} \right) = (\frac{1}{2})31/14.5 = 1.07$

2. LONG RUN

No. Each firm is earning a positive profit. In the long run, other firms will enter the industry, which will increase supply and decrease price until price equals the minimum of average total cost and each firm earns zero economic profit.

To find min ATC, set $ATC = MC$. $49/Q + 2 + Q = 2 + 2Q$. $Q^2 = 49$. $P = 2 + 14$.

$$Q_F = 7$$

$$P = 16$$

$$D(P) = 600 - 10(16) = 440 = Q_M$$

$$\# \text{ of firms} = Q_M/Q_F = 440/7$$

of firms = 62.86, which makes sense because it is greater than 20