

Problem set 7, due Tuesday, April 26th, 2016

1. Suppose that every firm in a particular industry (which is perfectly competitive) has the cost function $C(q) = 5q + \frac{1}{20}q^2 + 500$, and thus the marginal cost function $MC(q) = 5 + \frac{1}{10}q$, where q is the quantity of output it produces. Market demand is given by the function $Q_d(p) = 3500 - 100p$. Let n be the number of firms.

a) Find the supply function of each firm, $q_s(p)$, and use this to find the market supply function, $Q_s(p) = n \cdot q_s(p)$.

For parts b-d, suppose that in the short run there are 10 firms in the industry.

b) The short run market equilibrium price is _____. At this price, each firm produces $q =$ _____ units, and all the firms together produce $Q =$ _____ units.

c) Each firm has revenue $R =$ _____, cost $C =$ _____, and profit $\pi =$ _____.

d) Do firms want to enter or exit?

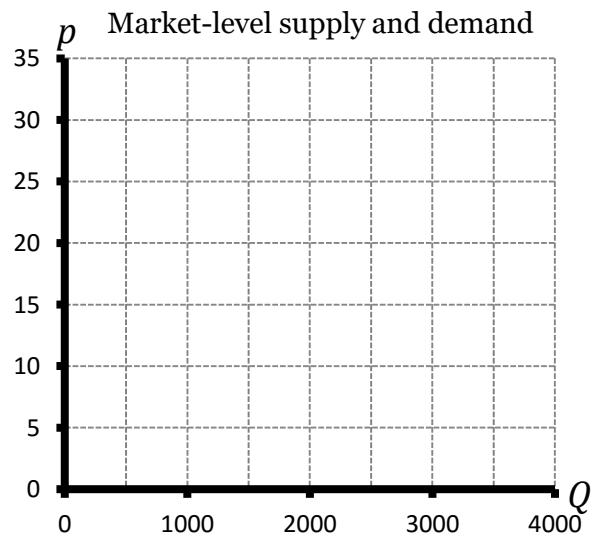
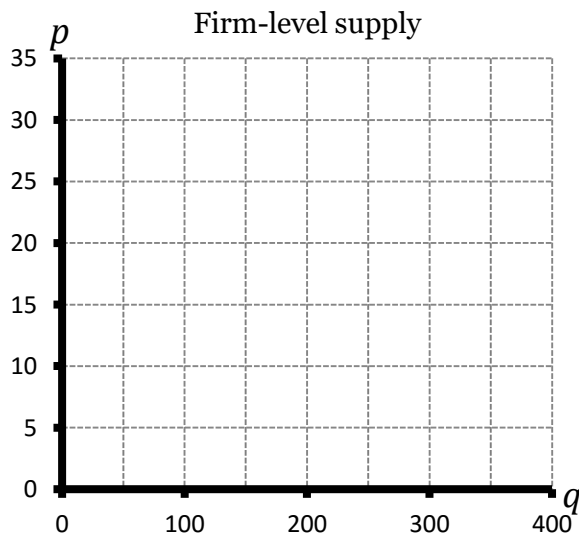
In parts e-g, we consider the long run equilibrium, in which firms do not want to enter or exit.

e) Find each firm's average cost function, $AC(q)$.

f) In the long run equilibrium, the price is $\tilde{p} =$ _____, and each firm will produce $\tilde{q} =$ _____ units of output.

g) Therefore, the number of firms in the long run equilibrium is $n^* =$ _____.

h) On the graphs below, sketch supply at the firm level and supply and demand at the market level.



2. Suppose that every firm in a particular industry (which is perfectly competitive) has the cost function $C(q) = 20q + \frac{1}{40}q^2 + 10$, and thus the marginal cost function

$MC(q) = 20 + \frac{1}{20}q$, where q is the quantity of output it produces. Market demand is given by the function $Q_d(p) = 2700 - 100p$. Let n be the number of firms.

a) Find the supply function of each firm, $q_s(p)$, and use this to find the market supply function, $Q_s(p) = n \cdot q_s(p)$.

For parts b-d, suppose that in the short run there are 2 firms in the industry.

b) The short run market equilibrium price is _____. At this price, each firm produces $q =$ _____ units, and all the firms together produce $Q =$ _____ units.

c) Each firm has revenue $R =$ _____, cost $C =$ _____, and profit $\pi =$ _____.

d) Do firms want to enter or exit?

In parts e-g, we consider the long run equilibrium, in which firms do not want to enter or exit.

e) Find each firm's average cost function, $AC(q)$.

f) In the long run equilibrium, the price is $\tilde{p} =$ _____, and each firm will produce $\tilde{q} =$ _____ units of output.

g) Therefore, the number of firms in the long run equilibrium is $n^* =$ _____.