Exam ECON2610 - solutions

Problem 1

a) The student should explain the PP and the CC curve in the monopolistic competition model, and explain the concept of equilibrium. The student should show that the CC curve will become steeper, so that equilibrium prices increase (and the number of firms declines).

b) $n^{old} = \frac{10}{4}\sqrt{10}$, $n^{new} = 2\sqrt{10}$. $P^{old} = \frac{1}{20} + \frac{1}{\frac{10}{4}\sqrt{10}}$, $P^{new} = \frac{1}{20} + \frac{1}{2\sqrt{10}}$. So the relative price is $P^{new}/P^{old} = \frac{\frac{1}{20}+\frac{1}{2\sqrt{10}}}{\frac{1}{20}+\frac{1}{\frac{10}{4}\sqrt{10}}}$. The mark-up is $\mu^{new} = 1 + \frac{10}{\sqrt{10}}$, $\mu^{old} = 1 + \frac{8}{\sqrt{10}}$.

c) Decrease F: Flatter CC curve

Increase S: Flatter CC curve. An increase in S can occur through trade.

d) From the analysis above, we know that n is not a function of c, so n remains unchanged. But prices go down, according to the equation for the PP curve.

A lower c will lower the intercept term (where the lines cross the y-axis) for both the CC and PP curve.

Bonus point if the student shows a numerical example.

Problem 2

a) This is a Cournot game. Profits are

$$\pi_1 = q_1 (12 - q_1 - q_2)$$
$$\pi_2 = q_2 (12 - q_1 - q_2)$$

The reaction curves are

$$q_1 = \frac{12 - q_2}{2}$$
$$q_2 = \frac{12 - q_1}{2}$$

Solving the two equations, we get

$$q_i = 4$$
$$p = 8$$
$$\pi_i = 16$$
$$\sum \pi_i = 32$$

b) This is a Stackelberg game. A strategy for firm 1 is a function which determines quantity produced q_1 for every possible quantity produced q_2. Firm

1's best response function is: $q_1 = (12 - q_2)/2$ (as in a)). We know that we can find the subgame perfect Nash equilibrium by backwards induction. We get

$$\begin{aligned} q_2 &= 6 \\ q_1 &= 3 \\ p &= 7 \\ \pi_2 &= 18 \\ \pi_1 &= 9 \\ \sum \pi_i &= 27 \end{aligned}$$

c) There is a considerable first-mover advantage. By being able to set its quantity first, firm 2 is able to gain a larger share of the market for itself, and even though it leads to a lower price, it makes up for that lower price with the increase in quantity to achieve higher profits. The opposite is true for the second mover: by being forced to choose after the leader has set its output, the follower is forced to accept a lower price and lower output.

- The leader has an advantage because (i) it knows that by increasing q_2, the follower will reduce q_1 and because (ii) the decision is irreversible (otherwise the leader would undo its choice and we would end up in Cournot again).
- Bonus point if the student explains that profits for the leader must be at least as large as in Cournot because the leader can always obtain Cournot profits by choosing the Cournot quantity.
- From the consumer's perspective, the Stackelberg outcome is preferable because overall, there is more quantity at a lower price. Prices are lower, total quantity higher, and total profits are lower, in Stackelberg compared to Cournot. While Stackelberg is more efficient than Cournot under symmetric costs c, this may not be the case if c varies across firms (i.e., if the leader is less efficient than the follower).