

Quiz 1: Market equilibrium model (30 minutes, only answer the question in the area provided under each part.!!!)

Suppose that market demand for ice-cream in Bangkok can be given by $P = a - 2Q$, where $a > 0$. Answer the following questions.

- a) (2 points) For now, suppose that there's only single manufacturing firm for the ice-cream market. Without constructing the revenue function, find the level of Q and P that result in maximizing revenue. Explain your answer.

We choose the midpoint on the demand curve as the point that attains revenue-maximizing level. That is because, at that point, demand is unit elastic.

$$P = a/2 \text{ and } Q = a/4$$

(p-intercept is "a" and Q-intercept is "a/2". So the midpoint is to divide both numbers by 2.)

From now on, I will instead assume that there are but two manufacturers in the ice-cream market. Supply for the first manufacturer is given by $P = 3 + Q$ meanwhile the supply equation of the second manufacturer is $P = Q$. Answer the following questions.

- b) (1 point) Find the domain set of prices to ensure that both suppliers stay active in the market.

$$Q = P - 3 ; P \geq 3$$

$$Q = P ; P \geq 0$$

So, $P > 3$ is needed to ensure that both suppliers produce $Q > 0$

- c) (2 points) Using the direct summation approach, derive the equation for market supply.

$$Q = P ; 0 \leq P \leq 3$$

$$Q = P - 3 + P = 2P - 3; \quad P > 3$$

- d) (3 points) Suppose that $a = 9$. Solve for market equilibrium. How many suppliers are there staying active in the market?

$$\text{If } a = 9.. P = 9 - 2Q \implies Q = \frac{9-P}{2}$$

Setting the above demand equation equal to the first part of market supply function.

$$\frac{9-P}{2} = P \implies P = 3 \implies Q = 3.$$

There is only one supplier who will be staying active in the market. A firm is said to be staying active in the market if it is producing positive amount of output, $Q > 0$. If you plug in $P = 3$ into the supply equation of the one given with $P = 3 + Q$, you will find out that this firm is producing nothing in the equilibrium. So this firm is not active in the market.

- e) (2 points) Suppose that $a = 100 - 0.7Y + 5C$ where C is the level of temperature in degree Celsius and Y is level of income in thousand baht. What do we know about the equilibrium price and quantity if (e.1) *income increases* and (e.2) *temperature drops*. State your predictions under each situation without solving for numbers/answers, and explain your answer.

- Note from the demand equation that an increase in “ a ” shifts demand curve up. This is because p-intercept increases when the value of “ a ” increases. Consequently, under the equilibrium, an increase in “ a ” would cause both Q and P to increase.
- e.1) Now, what happen to “ a ” if “ Y ” increase. “ a ” would drop if “ Y ” increases. Thus, Q and P would both drop in the equilibrium because demand curve shifts down.
- e.2) A decrease in temperature causes the value of “ a ” to decrease, and hence causing demand curve to shift down. This would cause both Q and P to decrease in the equilibrium.

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