



EE 211 Principles of Microeconomics

Online Quiz #3 (B)

Instructions (Please read carefully.)

1. You can either write your answers on papers and take pictures of your answers, or write them using a tablet. In either case, you need to save all pages in ONE single pdf-file and name your file in the following format: Firstname_studentID_quiz3B.pdf. For instance, Phatta_640464xxxxx_quiz3B.pdf.
2. You have 30 minutes to complete your quiz, and you will have 10 minutes for taking pictures, save the file, and upload the file to google classroom. That is, you need to upload your answers BEFORE 10:10 am.
3. While taking your quiz, please turn on your video camera but mute your microphone. Do not consult with other students or any other source. This is the honor system, and I believe in your integrity.
4. In the case that you have any technical problems (e.g. internet connection problem), which results in a submission delay, please capture your screen or take a picture of error messages for a proof. If you fail to submit your quiz in time (without any proof of technical problems), you will receive zero score for that quiz.
5. You may use a simple calculator.

Part I (Total 10 points)

Q

Suppose a competitive firm maximizes its profit by selling 1,000 units of its product at the given market price of \$20 per unit.

1. (1 points) State the profit-maximizing condition for this firm.

$$P = MC$$

2. (4 points) Suppose that at the profit-maximizing level of output, the firm's total cost (TC) is \$24,000 and its total fixed cost (TFC) is \$8,000. Calculate the firm's total variable cost (TVC) and average variable cost (AVC) at this equilibrium quantity.

$$\begin{aligned} TC &= TFC + TVC \\ 24,000 &= 8,000 + TVC \\ TVC &= \$16,000 \quad \Rightarrow \quad AVC = \frac{16,000}{1,000} = \$16. \end{aligned}$$

3. (3 points) At the given market price of \$20 per unit and the costs found in question 2, calculate the firm's profit. Should the firm stay in the market in the short run?

$$\pi = TR - TC = (20)(1,000) - 24,000 = -4,000$$

Since $P = 20 > AVC = 16$, the firm should stay in the market.

4. (2 points) Suppose now that there is an increase in market supply, and the equilibrium market price decreases to \$18, *everything else constant*. Should the firm continue selling its good in the market, or should it shut down? Justify your answer.

$$P^{new} = 18 > AVC.$$

The firm should still stay in the market,

$$\text{b/c } P > AVC.$$

Part II

Suppose the market demand is given by $P(Q) = 62 - 2Q$, and company "B" is the only producer in the market. Suppose further the total cost function is given by $C(Q) = 15 + 2Q$. $\rightarrow AC = \frac{15}{Q} + 2$

1. (3 points) Derive the total revenue (TR), marginal revenue (MR), and marginal cost (MC) functions.

$$TR = P \times Q = (62 - 2Q)Q = 62Q - 2Q^2$$

$$\Rightarrow MR = 62 - 4Q$$

$$C = 15 + 2Q \quad \Rightarrow \quad MC = 2$$

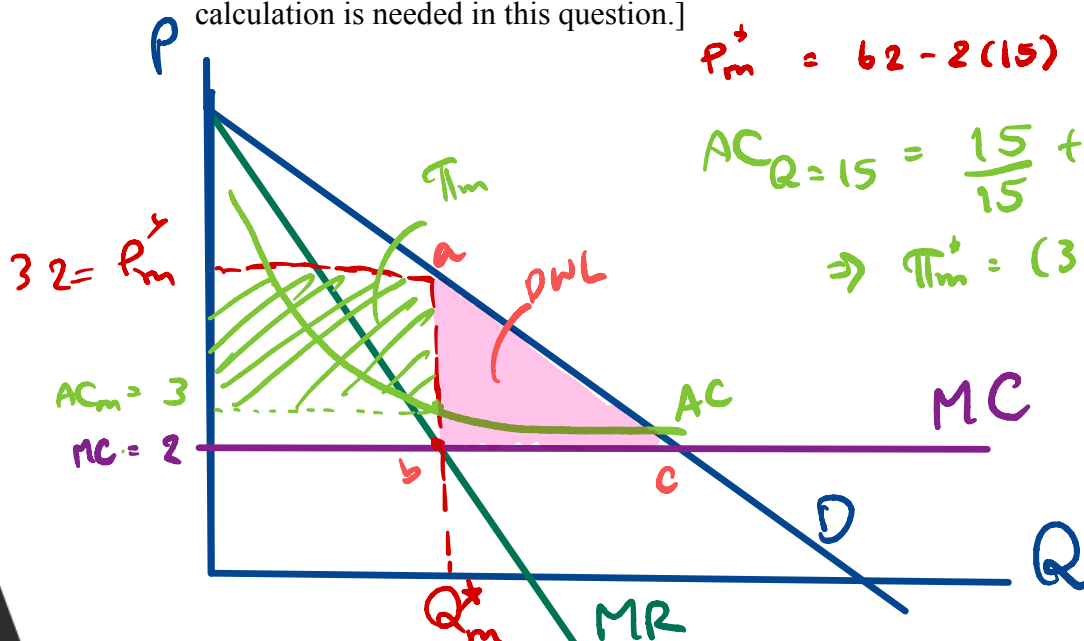
2. (3 points) State the profit-maximizing condition, and calculate the profit-maximizing quantity for company "B".

$$\pi\text{-max: } MR = MC$$

$$62 - 4Q = 2$$

$$60 = 4Q \quad \Rightarrow \quad Q_m^* = 15$$

3. (4 points) Draw a diagram to illustrate the profit-maximizing price and quantity for company "B". Make sure that you identify in the diagram: (i) profit-maximizing quantity, (ii) profit-maximizing price, (iii) the firm's profit, and (iv) the society's welfare loss. [Note: No calculation is needed in this question.]



$$P_m^* = 62 - 2(15) = \$32$$

$$AC_{Q=15} = \frac{15}{15} + 2 = 3$$

$$\Rightarrow \pi_m^* = (32 - 3) \times 15 = \$435$$

Society's welfare loss
= area (abc)