Assignment 2
Assigned on Apr 9th, 2022. To be submitted on Apr 23th, 2022 before midnight

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Instructions Sira Kalyanamitra 6404641059

(1) Please read the instruction carefully.
(2) Please read each question carefully and answer the questions straightforwardly. Always provide economic reasons at lease a paragraph for your analysis, or a graph when necessary, even when the question does not indicate so.
(3) Handing and submitting assignments are only available via BE Moodle.

Answering the questions and preparing answer sheets

(1) Answers are to be handwritten, in either digital or analog form, in a blank canvas or any clean paper. Make sure that your handwriting is clearly visible and readable.
(2) There is no need to rewrite the question. Just indicate the question number clearly for each of the answer, such as 1.a).
(3) When done, for the digital case, collage all the pages into a single PDF file. For those who write on sheets of paper, take photo of all pages then convert all of them into a single PDF file as well.
(4) Name your PDF file as StudentID_YourNickname, such as 640123456_Bo.

Submitting your answers

(1) Make sure your file does not exceed 10MB. This is the maximum file size for BE Moodle upload.
(2) Login to BE Moodle, head into the course, then the assignment topic.
(3) Choose your file to submit. Done. There will be timestamp for your upload date and time, so please make sure to not submit later than that.

Assignment 2
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1. Consider a long-run production in which there are only two inputs labor and capital, and the input prices for labor and capital are wage (w) and interest rate (r), respectively. Suppose that at the equilibrium levels of labor and capital (L^*, K^*), the marginal product of labor (MP_L) and marginal product of capital (MP_K) are 6 and 8, respectively.

1.a) Calculate the marginal rate of technical substitution (MRTS), and state the cost-minimization conditions of this firm, given that the required output is fixed at Q_0. If the market wage rate (w) is \$3, what is the interest rate at the equilibrium?

1.b) Suppose now that the wage rate (w) increases to \$4, *ceteris paribus*. Draw a diagram to illustrate the changes in the cost-minimizing combination of inputs.

2. Suppose that in the long-run production of wine, a firm uses two inputs: workers (L) and machines (K). At the required output of 3,000 bottles of wine, the firm's least-cost input combination is 200 units of L and 50 units of K, and the per-unit input prices for L and K are \$10 and \$20, respectively. Suppose further that at this least-cost combination of inputs, the marginal product of the 50th machine (MP_K) is 8 bottles of wine.

2.a) Draw a diagram to illustrate this firm's cost-minimization decision, where L is on the x-axis and K is on the y-axis. Also, explain the firm's cost-minimization conditions.

2.b) At the equilibrium in part a., what is the marginal product (MP_L) of the 200th workers?

2.c) Suppose that the input price for L increases to \$15 per unit, while the input price for K and the required amount of output are the same. Draw another diagram to illustrate the change in the least-cost input combination.

2.d) Explain the difference between short-run and long-run production.

① 1.a) $MP_K = 8$, $MP_L = 6$

$$MRTS_{LK} = \frac{MP_L}{MP_K} = \frac{6}{8} \quad \#$$

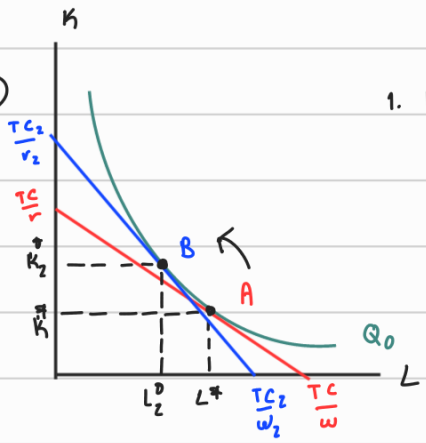
Tangency Condition $\Rightarrow \frac{MP_L}{MP_K} = \frac{w}{r}$

$$\frac{6}{8} = \frac{3}{r}$$

$$r = \frac{8 \cdot 3}{6} = 4 \quad \#$$

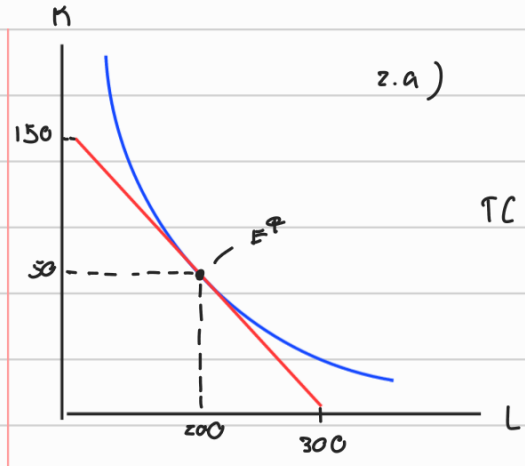
$\therefore$ The interest rate at equilibrium is 4 $.

1. b)



1. If $w \uparrow (3 \to 4) \to \frac{TC}{w} \downarrow \to$ isocost will shift inward
2. $\frac{TC}{w} \downarrow \to$ the same total cost can't produce output at Q_0
3. If $w \uparrow$ in order to produce Q at Q_0
   1) $L \downarrow$ 2) $K \uparrow$ 3) $TC \uparrow$
4. A move to B

(2)



2.a) $Q = 3000$, At $E^* \Rightarrow L^* = 200$ $K^* = 50$

$w = 10$, $r = 20$, $MP_K = 8$

$TC = Lw + kr = 200 \cdot 10 + 50 \cdot 20 = \$3000$

tangent condition $MRTS = MRMS$

$$\left|\frac{\Delta K}{\Delta L}\right| = \frac{w}{r}$$

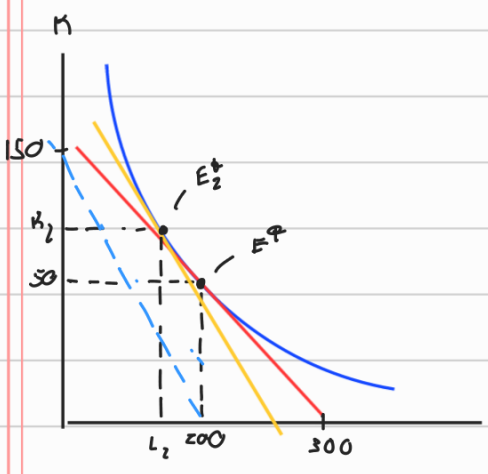
$$\left|\frac{0 - 150}{300}\right| = \frac{10}{20} = 0.5 \ \#$$

2.b) tangent condition $\Rightarrow \frac{MP_L}{MP_K} = \frac{w}{r}$

$$\frac{MP_L}{8} = \frac{10}{20} \Rightarrow MP_L = 4$$

$\therefore$ The marginal product of 200^{th} labor is 4 bottle of wine

2.C) If $w \uparrow \rightarrow 15$



When $w \uparrow$ the slope of iso cost will be steeper ($\frac{w}{r} \uparrow$) causing the new cost minimization point moving from (E^* to E_2^*)

New E (E_2^*)

If the firm want to produce at the same out put, the firm must buy more capital, hire less labor (and add the total cost)?

2d.) The different between shortrun and longrun production is that in shortrun there will be at least one fixed fop but in longrun every fop is a variable factor.

3. Consider a perfectly competitive market, in which the current equilibrium price is 150 baht per unit.

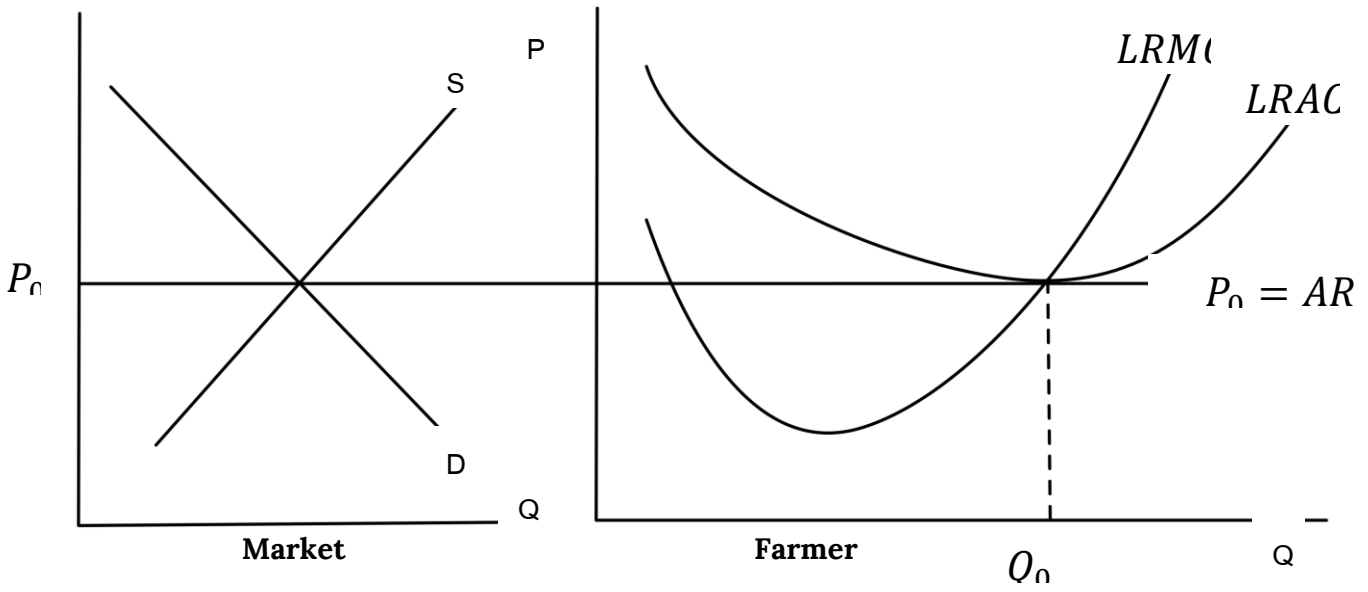
3.a) Suppose that a firm in this market sells 20 units of its output. State the profit-maximizing condition of this firm, and draw a diagram to illustrate how the equilibrium quantity is determined.

3.b) At this equilibrium quantity of 20 units, suppose that the firm's average total cost is 180 baht, and its average fixed cost is 60 baht. Calculate this firm's average variable cost, total revenue, total cost, and profit.

3.c) From part b., should this firm stay in the market in the short run? Justify your answer.

3.d) Suppose now that the market demand decreases, and the market price decreases to 120 baht per unit. Draw two diagrams to illustrate: (i) the change in the equilibrium price and quantity in the market, (ii) how the change in the market price affects the firm equilibrium quantity and profit. Would your answer from part c. change?

4. A Thai rice farmer is in a long run equilibrium in a perfect competition and produces at the quantity Q_0 as shown in the graph below.



4.a) The government grants a lump sum subsidy to every farmer. How will this change the LRAC? Explain why LRMC does not change.

4.b) (10 Points) Will the lump sum subsidy change the quantity the farmer wants to produce to maximize his profit? Show in the graph that the farmer now earns an Excess Profit. Explain.

4.c) (10 Points) Demonstrate how this Excess Profit will affect the market price in the Long Run that allows new entry to the market.

5. House and Land (HL) is the monopolist in a luxury housing market. It is a very efficient firm in which workers can construct houses with constant marginal cost and average cost. The demand and cost functions for HL are given as follows. (P is in million-baht unit).

$P = 60 - 0.6Q$

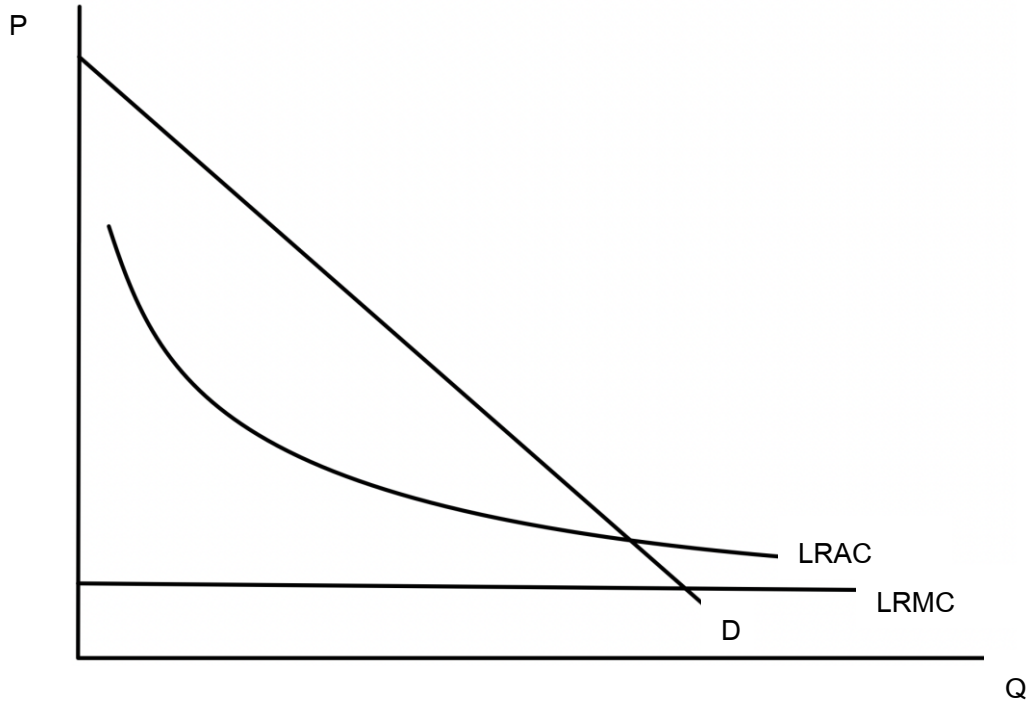
$MC = AC = 24$

5.a) Derive the marginal revenue function. Draw a diagram to illustrate the demand, marginal revenue, marginal cost, and average cost curves.

5.b) State the profit-maximizing condition for HL, and determine the optimal units of houses. Also, indicate the profit in the diagram, and explain how this profit can be derived.

5.c) The government tries to encourage more people to have access to luxury houses, so they launch a policy forcing HL to sell their houses at the ideal price. Draw another diagram to indicate the ideal price and determine the corresponding quantity at this price. Illustrate the social welfare before and after the intervention in the diagram and discuss.

6. The producer of the upcoming vaccine for COVID-19 is a monopoly who wants to price their vaccine to maximize profit. The cost of producing the vaccine is mostly fixed cost involving the research so that the Long Run Average Cost (LRAC) keeps declining the more vaccine is produced. The Long Run Marginal Cost (LRMC) is a small constant cost at all production level.



6.a) If the demand of vaccine is downward sloping as usual, show the equilibrium price and quantity that will maximize the profit. State the equilibrium conditions. Identify the profit and the deadweight loss to the society.

6.b) Assumed that monopoly price is $50 per dose, marginal cost $10, calculate the Lerner's index of monopoly power.

6.c) Determine the Ideal Price? Will the monopoly earn any profit at this Ideal Price? Explain.

6.d) Determine the Fair Price? Is there still deadweight loss at this Fair Price? Explain.

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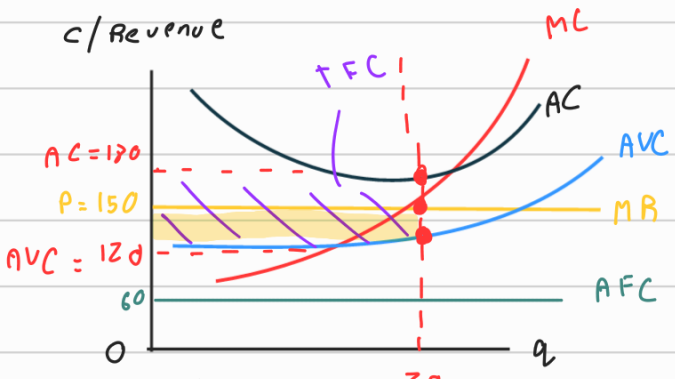
3 a)



3b) $P = 150$, $q^* = 20$, $AC = 180$, $AFC = 60$

Find AVC, TR, TC, π

$AC = AFC + AVC$

$180 = 60 + AVC$

$AVC = 120$

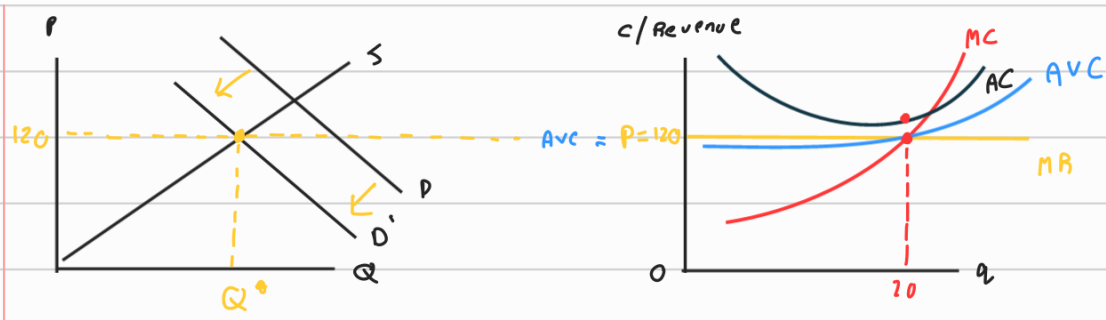
$TR = 150 \cdot 20 = 3000$

$TC = 180 \cdot 20 = 3600$

$\pi = TR - TC = 3000 - 3600 = -600$

3c) The firm should stay in the market in the shortrun ∵ if we shut down the production revenue can be a part used for the fixed cost ($P > AVC$ no need to shutdown).

3d)



When the market price decrease to 120 baht per unit, the Q^* and profit also drop ∵ P = AVC, the firm can choose to either continue the production or shut down.

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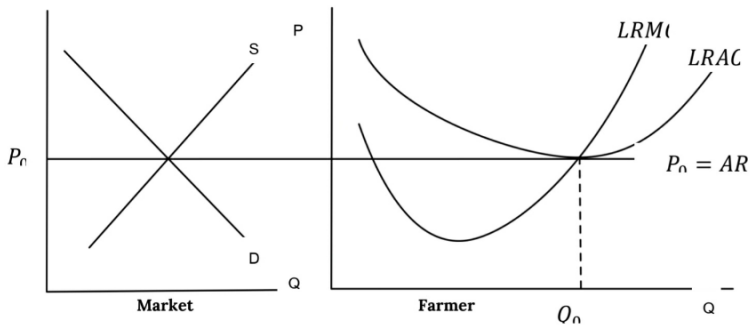

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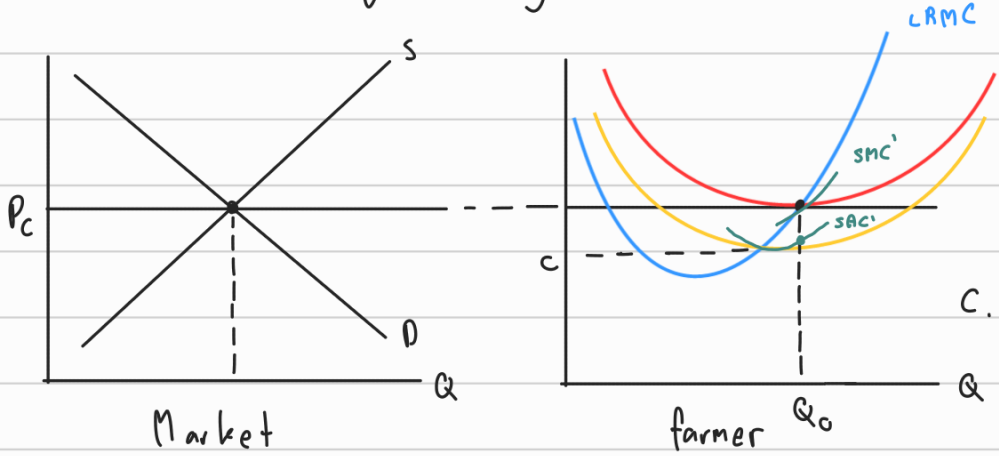
4.c) (10 Points) Demonstrate how this Excess Profit will affect the market price in the Long Run that allows new entry to the market.

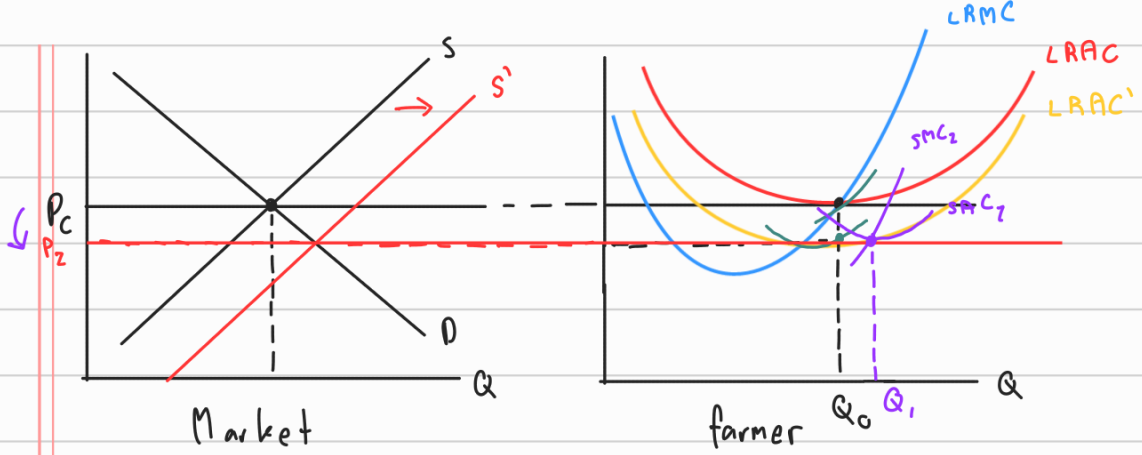
4.a) The lumpsum subsidy will decrease TC (Decreasing in fixed cost). making LRAC decrease. In the longrun, LRMC does not change ∵ the quantity of output does not change (subsidy decrease FC not VC)

4.b)



LRAC ↓, SAC at Q_0 gives AC at C. ∵ $P_C > C$, there is excess profit

No the farmer will not change the profit maximazing output [P_C = LRMC]. ∵ Both P and LRMC does not change, the quantity remain at Q_0



In the longrun, farmers are attracted to the market because of the excess profit. As more farmers enter the market, supply increases, pushing down the market price and increased the quantity produced. In the longrun the price will be decreased to the point that farmer is only making normal profit.

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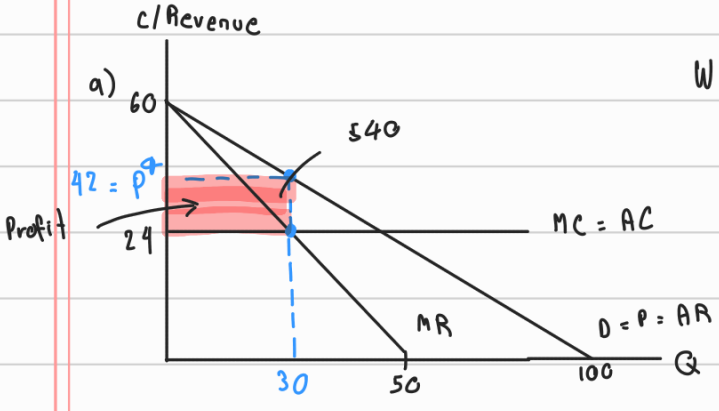
a)



When D is linear ⇒ MR = P = 60 - 1.2Q #
(MR is twice steeper)

b) Profit-maximizing condition

↓

$MR = MC$

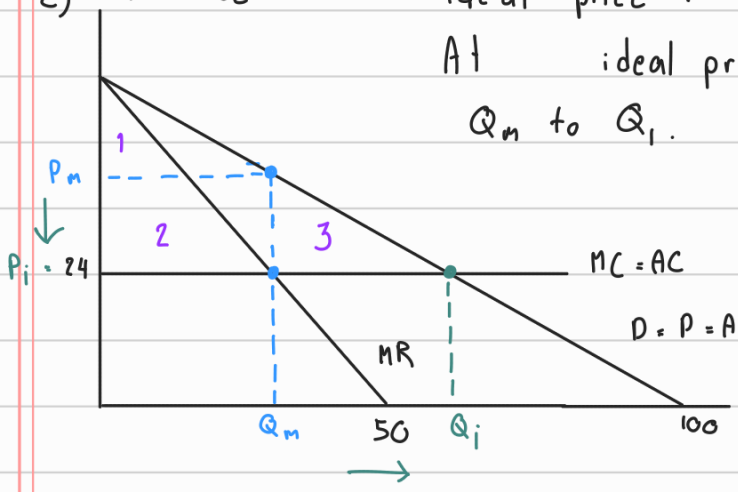
$60 - 1.2Q^* = 24$

$Q^* = 30$ units #

Price $= 60 - 0.6(30) = 42$

$\pi = (P - C) \cdot Q = (42 - 24) \cdot 30 = 540$ million Baht ⇒ shaded area

c) c/revenue



ideal price : P = AC

At ideal price, quantity increases from Q_m to Q_1.

Before intervention

CS → 1

PS → 2 DWL → 3

After intervention

CS → 1 + 2 + 3

PS → - DWL → -

The government intervention prevents HL from exploiting the consumers and get rid of DWL.

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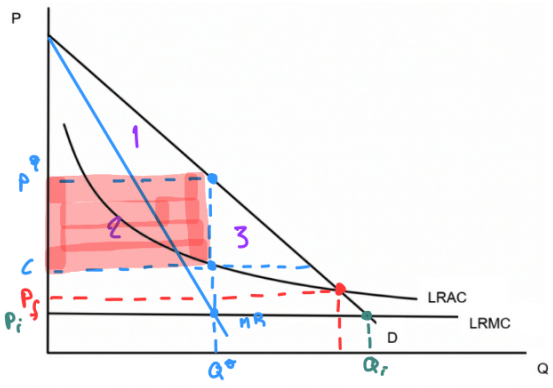

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a)

Equilibrium Q^* ⇒ MR = LRMC

CS: 1

Producer's Profit: 2 ⇒ $(P^* - C) \cdot Q^*$

b) Lerner's index, $1 = \frac{P - MC}{P} = \frac{50 - 10}{50} = 0.8$ #

c) Ideal price ⇒ P = MC = 10$

∴ At P_i the firm will receive loss (P < LRAC)

d) Fair price ⇒ P = LRAC

∴ At P_f, there is no DWL ∵ the firm is at normal profit.