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

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Instructions

(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.

EE211 Principles of Microeconomics **Section 1** Weerawat Phattarasukkumjorn
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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.

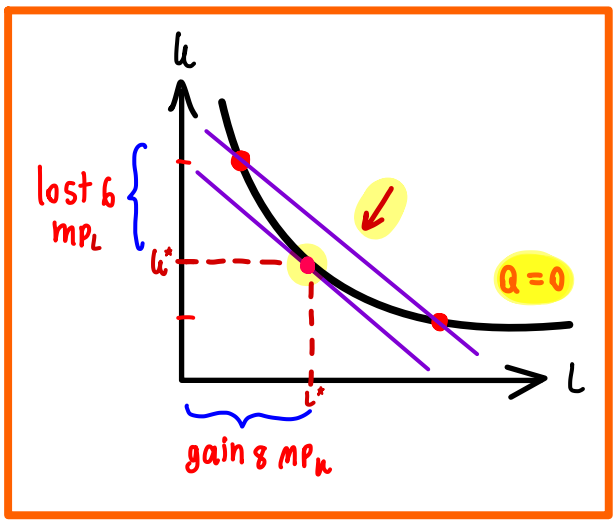
1.a) Calculate the marginal rate of technical substitution (MRTS), and state the cost-minimization conditions of this firm, given that the required output is fixed at Q_0. If the market wage rate (w) is \$3, what is the interest rate at the equilibrium?

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.

1a) @ the (L^*, K^*), $MP_L = 6$ & $MP_K = 8$ → $q = f(K, L)$ → Long run

↳ ① marginal rate of technical substitution (MRTS) → SLOPE OF ISOQUANT

$$MRTS_{LK} = \frac{\Delta K}{\Delta L} = \frac{MPL}{MP_K} = \frac{6}{8} = \frac{0.75}{1}$$



∴ In order for the firm to keep the level of the output the same, it needs to sacrifice 0.75 units of capital (K) and will get 1 unit of labor.

② cost minimization conditions?
↳ MRTS = MRMS → m of isocost ↳ required q @ isoquant Q = 0
m of isoquant

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$

③ market wage rate (w) = \$3 → int. rate = ?

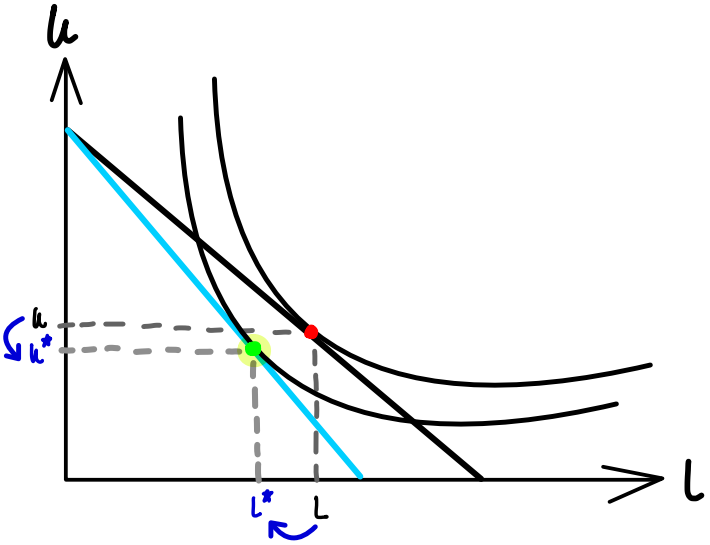
$$\frac{MPL}{MPK} = \frac{3}{r} \rightarrow \frac{6}{8} = \frac{3}{r}$$

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

@ output Q_0 → r = wage rate / MRTS = $\frac{3}{0.75}$ = \$4

∴ The interest rate at the equilibrium is 4.

1b) wage rate (w) increases to $4



↳ new (L^*, k^*)

↳ units of both capital & labor decrease when wage rate increase to $4.

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.

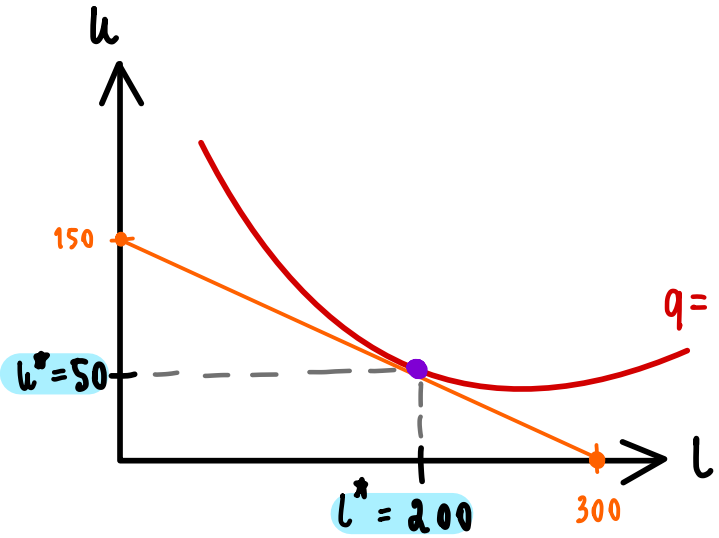
2a

↳ output/q = 3,000 bottles

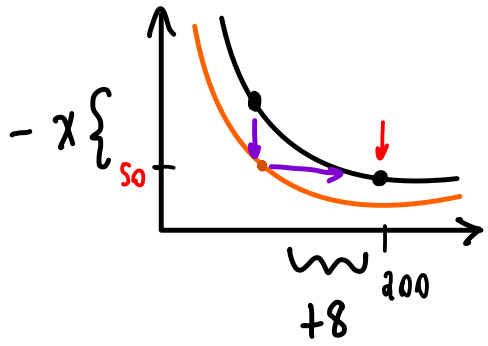
least c. inp. ⇒ L = 200 units / k = 50 units

input prices: L = \$10 / k = \$20

MP_k = 8 bottles of 50th machine



q = 3,000 bottles



$TC = (w \cdot L) + (r \cdot k)$

$TC = (10 \cdot 200) + (20 \cdot 50)$

$TC = 2000 + 1000$

$TC = 3000$

$3000 = (10 \cdot L) + (20 \cdot 0)$

$3000 = 10 \cdot L$

$L = 300$

} when machine (k) = zero (0) → (300, 0)

$3,000 = (10 \cdot 0) + (20 \cdot k)$

$3,000 = 20k \rightarrow k = 150$

} when labor (L) = zero (0) → (0, 150)

$\frac{mpl}{mpk} = \frac{w}{r}$

$\frac{MPL}{8} = \frac{10}{20}$

∴ The optimal in order to minimize the cost & keep the level of output, firm = sacrifice 1 (k) and get 2 (L) → q(50, 200)

↳ Firm's cost minimization conditions

MRTS = MRMS

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

$\left|-\frac{150}{300}\right| = \frac{10}{20} = \frac{1}{2}$

2.b → @ the equlibrium in part (a) → what is the (MP_L) of the 200th worker?

mp_k = 8 bottles of 50th machine (k)

↳ $\frac{MP_k}{MP_L} = \frac{w}{r}$

↳ $\frac{8}{MPL} = \frac{10}{20}$

$MP_{L(200)} = 16$ //

2.C → input price L increases by $15 per unit (↗ $10 (before))

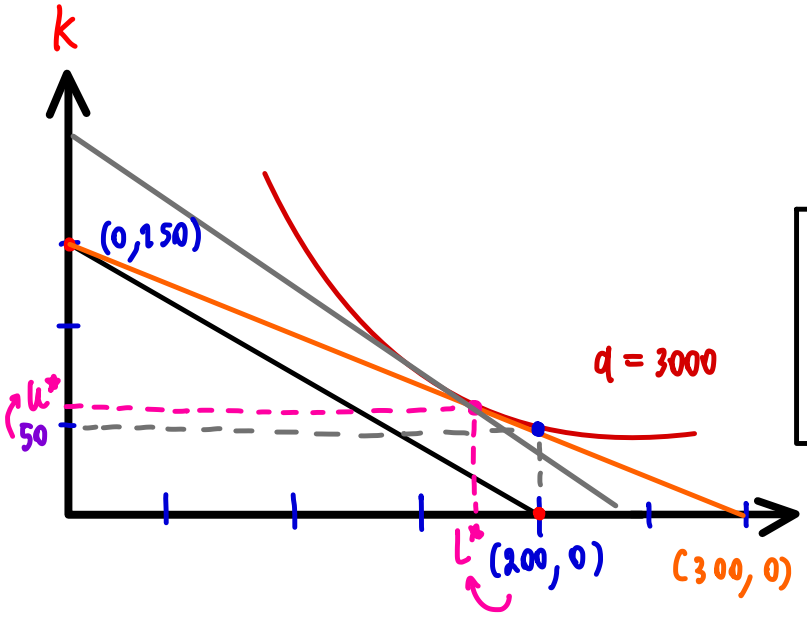
→ k = $20 & output = 3,000 bottles

$TC = r \cdot k + w \cdot L$

$3{,}000 = (20)k + (15)L$

when k = 0 → $L = \frac{3000}{15} = 200$ (200, 0)

when L = 0 → $k = \frac{3000}{20} = 150$ (0, 150)



↳ The isocost tilt when the wage increases by $5 from $10 to $15.

∴ when w↑, in order to keep the same level of output, the firm will use less labor but more capital. Meaning that the production is now more capital-intensive.

2.d Explain the difference between the short run & long run production.

↳ In the short run production, there is at least 1 factor is fixed while the firms will take time to expand (k).

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

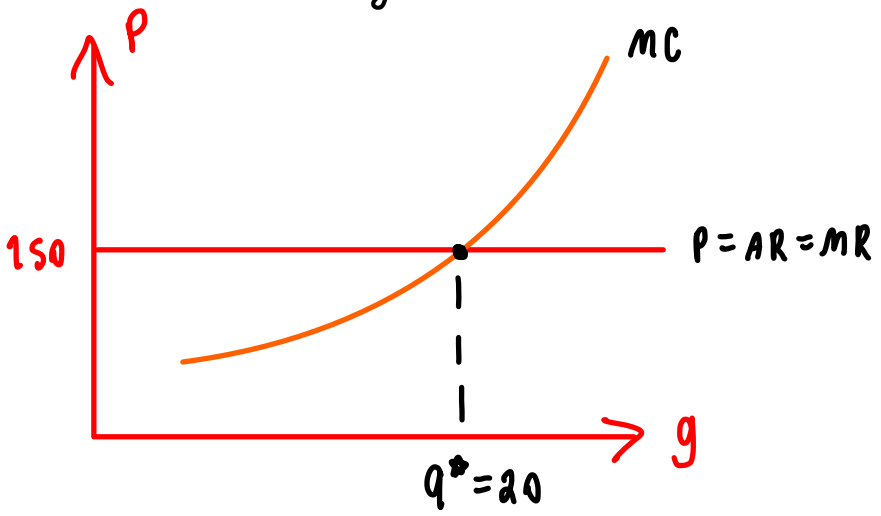
3.a) Suppose that a firm in this market sells 20 units of its output. State the profit-maximizing condition of this firm, and draw a diagram to illustrate how the equilibrium quantity is determined.

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?

3.a → firm in mk. sells 20 units of its output
→ Profit maximizing condition? + diagram (eq. q)



3.b $q^* = 20$ / AFC = 60 / ATC = 180

↳ AVC = ATC − AFC = 180 − 60 = 120 baht

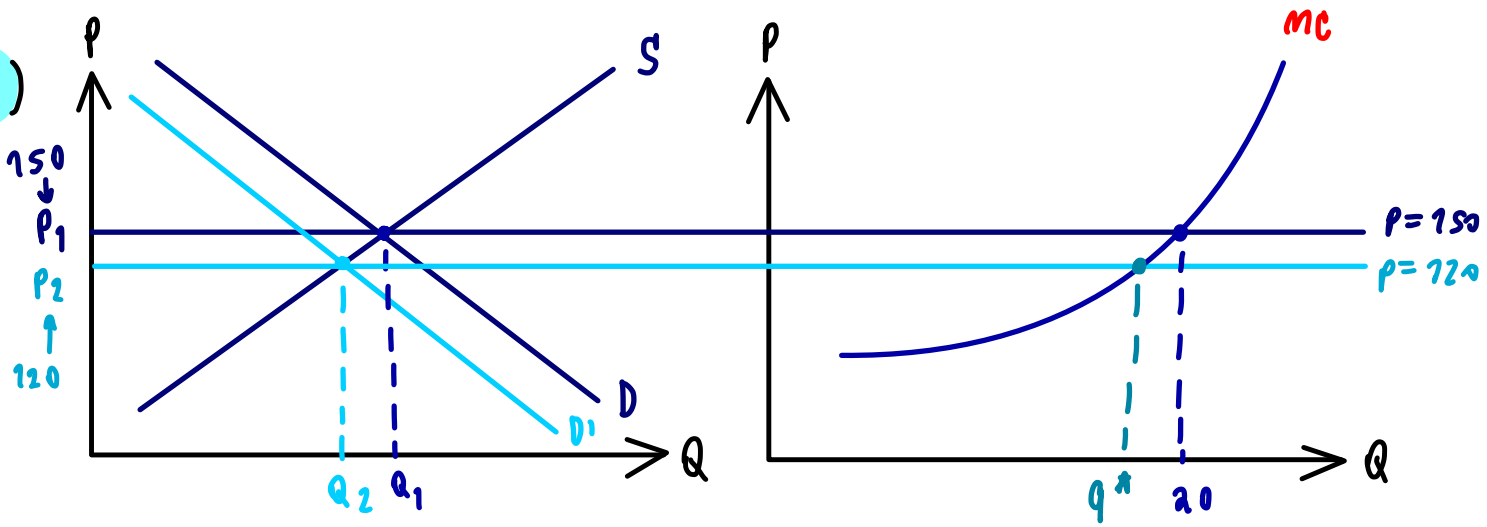
TR = p · q = 150 · 20 = 3000 baht ↓ lost

TC = ATC · q = 180 · 20 = 3600 baht ↑

profit (π) = TR − TC = 3000 − 3600 = −600 baht

3c) Yes, the firm should remain in the SR market even with the lost because the firm is in the least loss situation where $P > AVC$. In which, the difference between P & AVC still can use for paying the fixed costs since in SR, the fixed factor can't be adjusted.

3d)

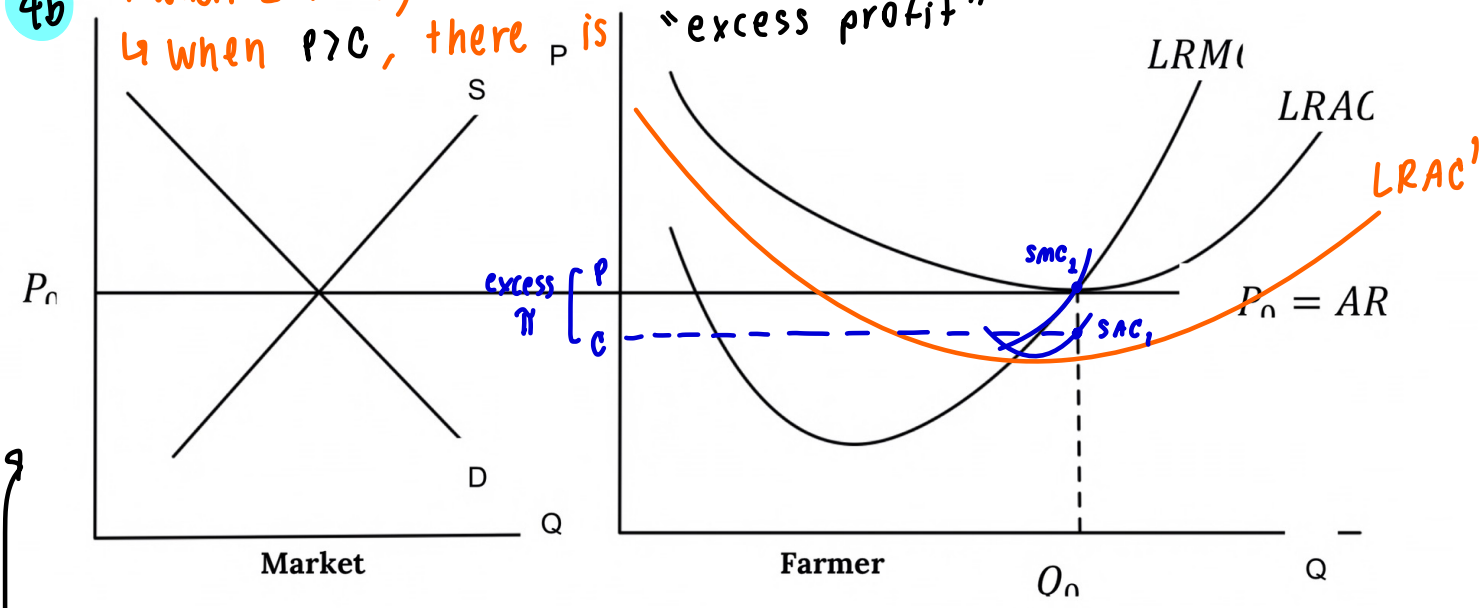


↳ As the price market drops from 150 to 120, the equilibrium quantity and profit (π) will drop.

↳ So P=AVC and if the firm will keep producing or stop are the same / in different.

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.

4b ↳ when LRAC↓, SAC @ Q_0 gives avg. cost C.
↳ when P>C, there is "excess profit"



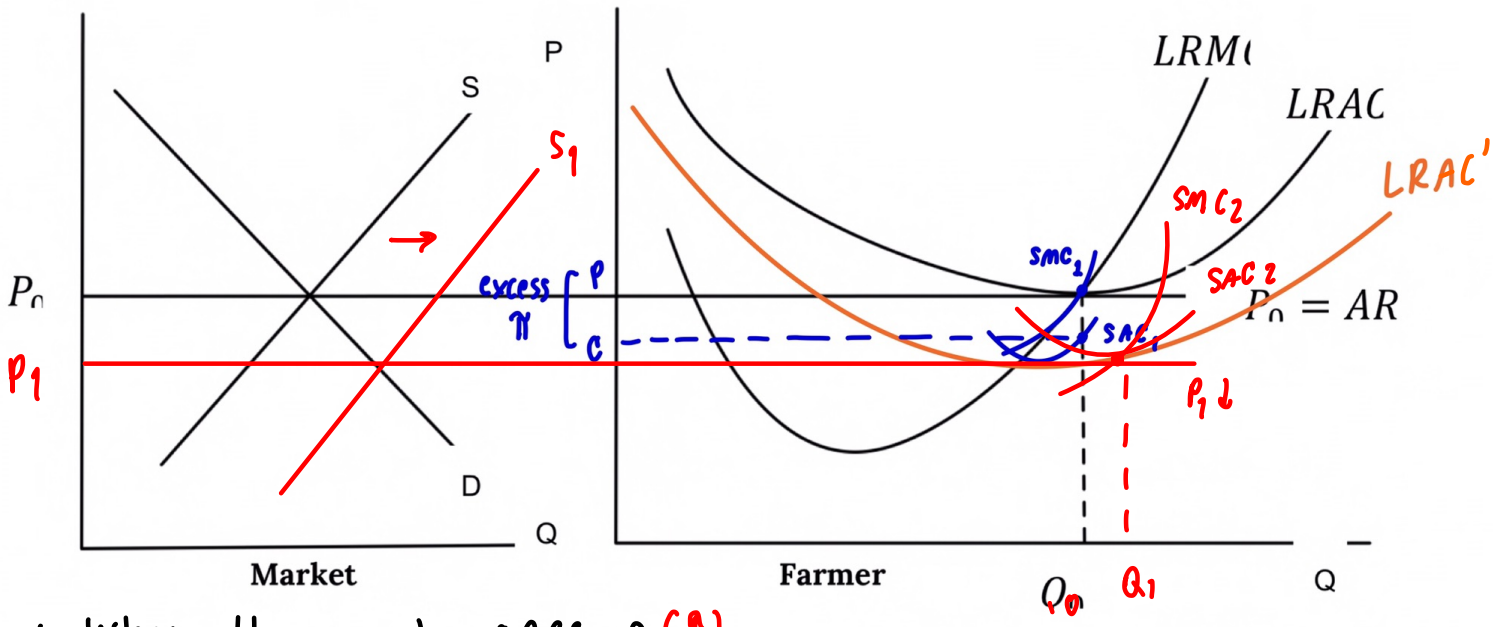
4.a) The government grants a lump sum subsidy to every farmer. How will this change the LRAC? Explain why LRMC does not change.

4a) ↳ Subsidy will decrease TC. This will make LRAC drop. Since this farmer is a price taker in the perfect competition, the competitive price & equilibrium quantity remain constant.
↳ So, LRMC has no chance as there is no change in q.

4b) No, because the profit maximization is when P = LRMC. At this pt, both P & LRMC do not change. The optimal quantity to maximize profit will be the same @ (Q_0)

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.

4C In the Long run, the excess profit will attract new farmers to market = Supply ↑



↳ When the supply goes up (↑)
The price in the market will then drop.

↳ This will increase the optimal quantity to maximize the profit.

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).

$P = 60 - 0.6Q$

$MC = AC = 24$

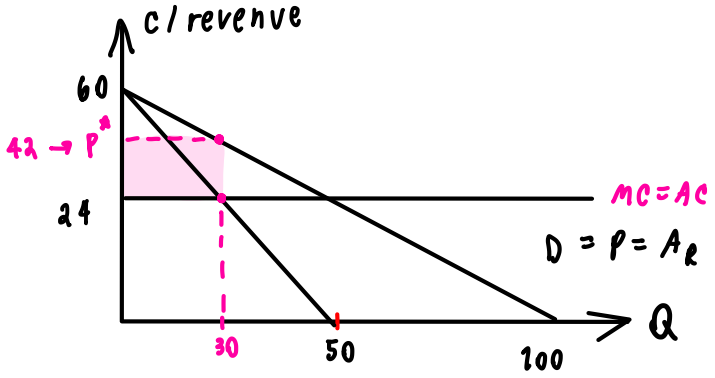
5.a) Derive the marginal revenue function. Draw a diagram to illustrate the demand, marginal revenue, marginal cost, and average cost curves.

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.

5a) when D is linear, MR is 2 times steeper..

↳ MR: $P = 60 - 1.2Q$



5b) profit-maximizing condition

↳ MR = MC

$60 - 1.2Q = 24$

$Q^* = 30$ units

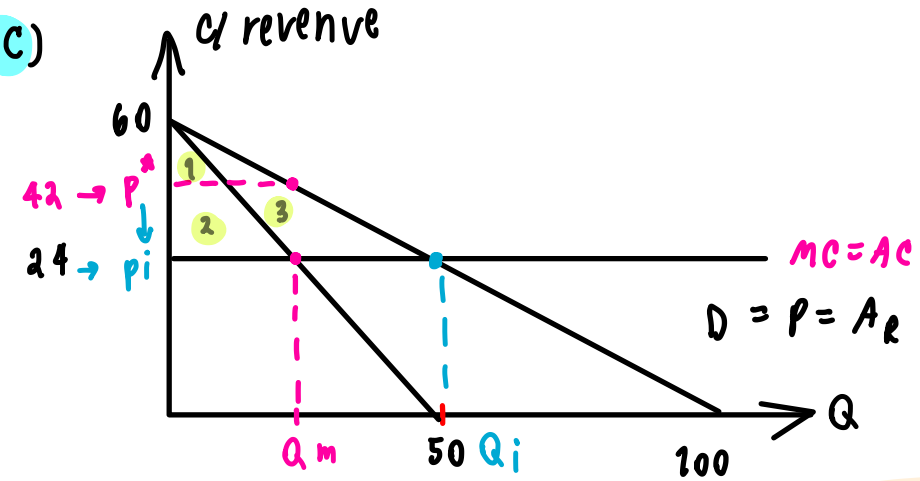
$P = 60 - 0.6(30)$

$P = 42$

↳ Profit (π) = $(P-C)(Q) = (42-24)30$

$= 540$ MB ↑ The area shaded

5C)



↳ Ideal Price : P=MC

- quantity ↑ from Qm to Qi

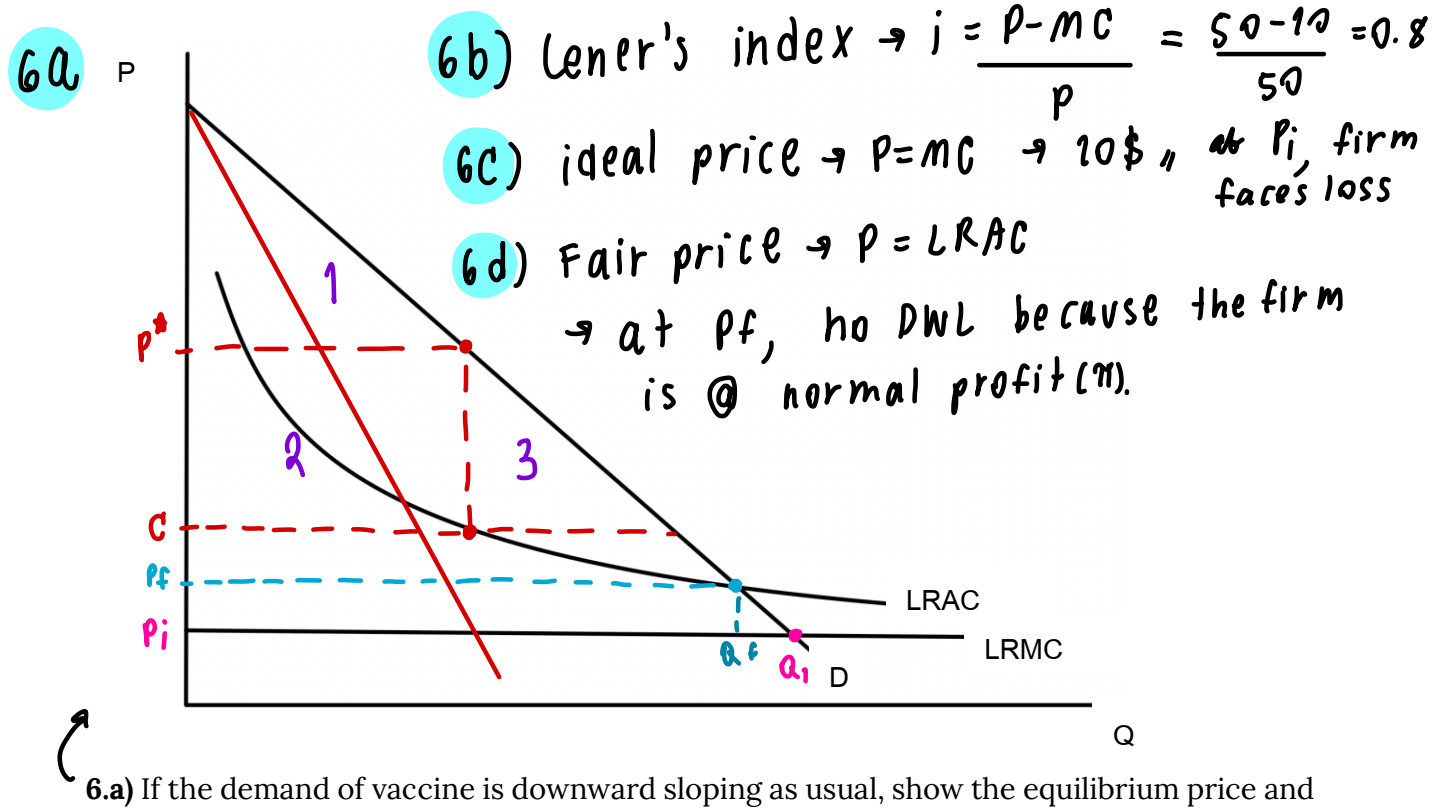
↳ Before intervention

- CS = 1 PS = a(π) DWL = 3

↳ After intervention → CS = 1 + 2 + 3 / PS = - / DWL = -

∴ The intervention prevents HL from taking the advantages from the cosumer & removes the DWL.

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.

equilibrium Q^* = MR = LRMC
- DWL = 3
- CS = 1
- Producer's profit = 2
  $= (P^* - C)(Q^*)$

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