Assignment 2

Pongkarn Thammapuech
6404640853

① $q = f(K,L)$ in long run = no fixed factor , $MP_L = 6$ $MP_K = 8$

a) $MRTS = \frac{\Delta K}{\Delta L} = \frac{MP_L}{MP_K} = \frac{6}{8} = 0.75$ #

(drop K, get L)

marginal rate of technical substitution (slope of isoquant)

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

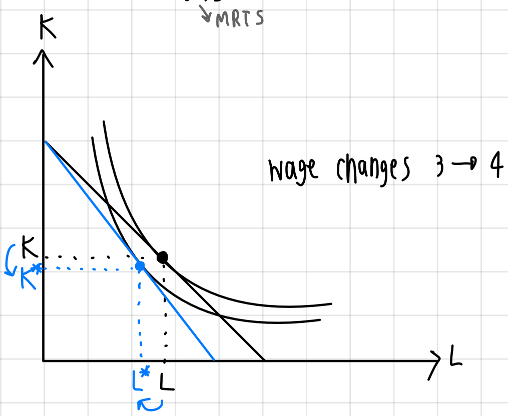
∴ cost-minimization condition is MRTS = MRMS (slope of isocost)

(slope of isoquant) $\frac{MP_L}{MP_K} = \frac{w}{r} \Rightarrow \frac{MP_L}{w} = \frac{MP_K}{r} \Rightarrow \frac{6}{3} = \frac{8}{r} \Rightarrow r = 4$

at Q_0, $r = \frac{3}{0.75} = \$4$ #

(wage rate) (MRTS)

b)



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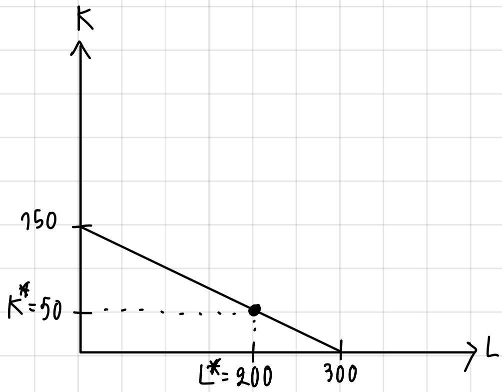
② $q = (K,L)$ in long run. , require output = 3000

a)



$Q^* = 3000$ $TC = L \cdot w + K \cdot r$
$= 200(10) + 50(20)$
$= 3000$

intercept : $K = 0 \rightarrow 3000 = 10L \rightarrow L = 300$
$L = 0 \rightarrow 3000 = 20K \rightarrow K = 150$ } use to graph

∴ cost-minimization condition ⇒ MRTS = MRMS

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

$\left|\frac{-150}{300}\right| = \frac{10}{20} = \frac{1}{2}$ # (give 1K, gain 2L)

∴ The optimal choice in order to minimize the cost and keep the level of output, Firm sacrifice 1 capital (K) and get 2 labor (L)

$q(K^*, L^*) = q(50, 200)$ #

b) MP_L of 200th labor = ?

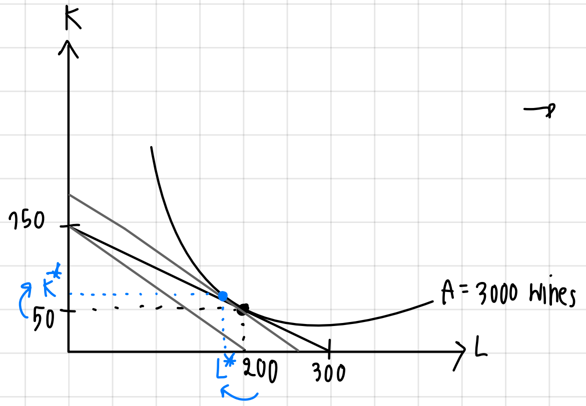
→ $\frac{MP_L}{MP_K} = \frac{w}{r}$

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

$= \frac{10}{20} \cdot 8$ (MP_K of 50th K)

$= 4 \cdot 4 = 16$ #

c)



(w)
Input for L increases 10 → 15
→ 3000 = 15L + 20K
when L = 0 : 3000 = 20K ; K = 150
K = 0 : 3000 = 15L ; L = 200

∴ when w ↑, in order to keep the same level of output. Using less labor but more capital. The production becomes more capital-intensive #

d) In short-run production, at least 1 factor is fixed as firms take time to expand (K)
In long-run production, all FOP are variable and can be adjusted.

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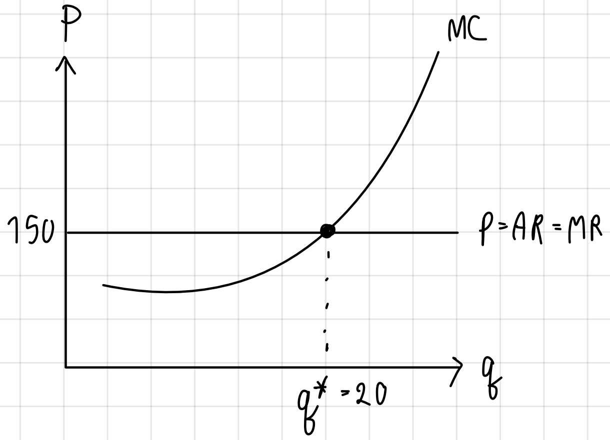
③ Perfectly competitive, 150 /unit,

a)



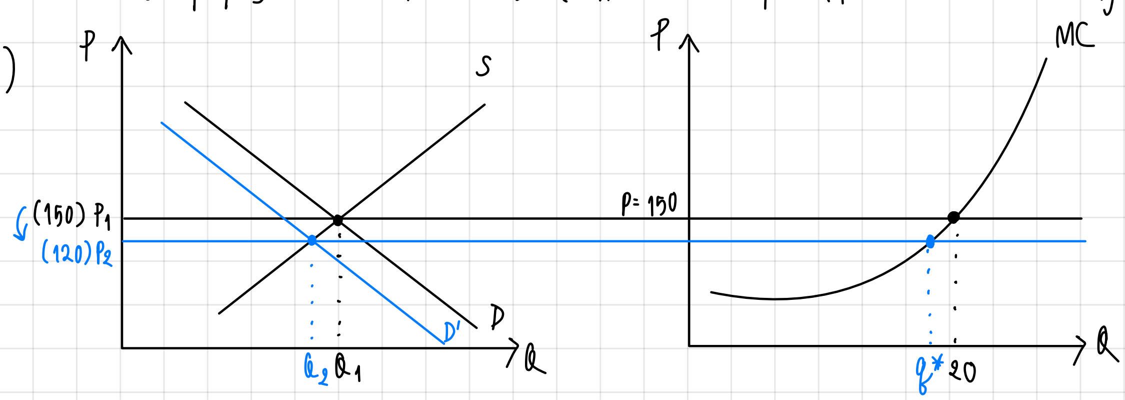
∴ Profit-maximization condition : MC = MR

b) $q^* = 20$ ATC = 180 AFC = 60

- AVC = ATC − AFC = 180 − 60 = 120 Baht #
- TR = P · q = 150 · 20 = 3000 Baht #
- TC = ATC · q = 180 · 20 = 3600 Baht #
- Profit (π) = TR − TC = 3000 − 3600 = −600 Baht # (lost)

c) Yes, the firm still should stay in the short run market eventhough facing loss. This is because the firm is in the least loss situation where P > AVC. The difference b/w P and AVC still can use for paying the fixed costs since in short-run, fixed factors can't be adjusted.

d)

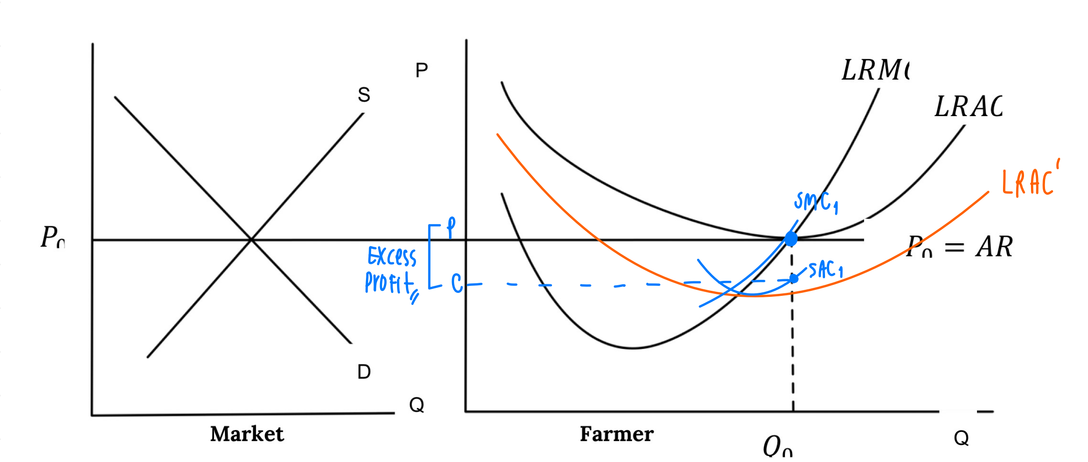


∴ When price market drops from 150 → 120, the equilibrium quantity and profit will DROP.
now P = AVC, keep producing at q* or stop are indifferent

④ long-run eqrb , perfectly competitive

a) Subsidy will decrease TC . This makes LRAC drops.
Since farmer is a price taker in the perfect competition , The competitive price and equilibrium quantity remain constant. So, LRMC has 'no CHANCE' as there is no Change in q.

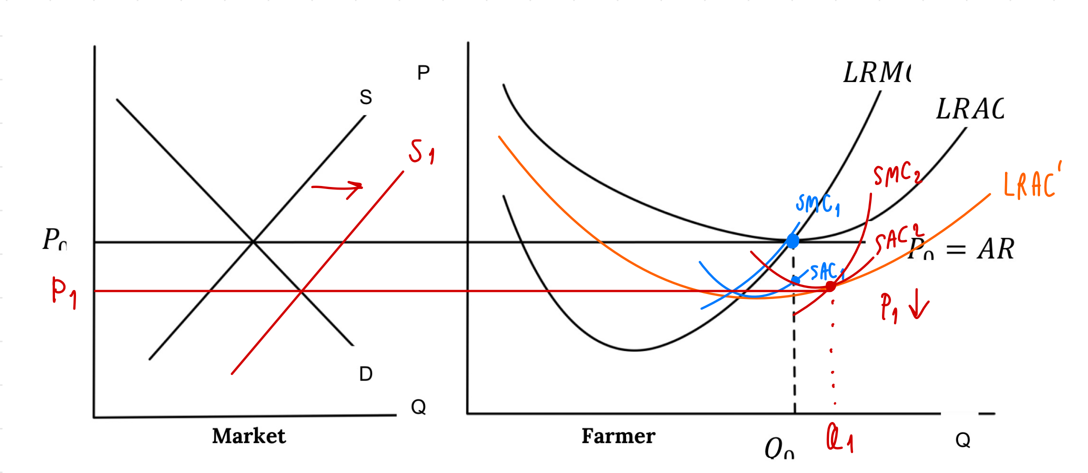
b) No, Because the profit maximization is when P = LAMC. Here, both P and LRMC do not change, the optimal quantity to maximize profit will be the same (Q_0)



When LRAC↓ , SAC at Q_0 gives average cost C.

when P > C , there is "excess profit"

c) In long-run , excess profit will attract new farmers to market → supply ↑

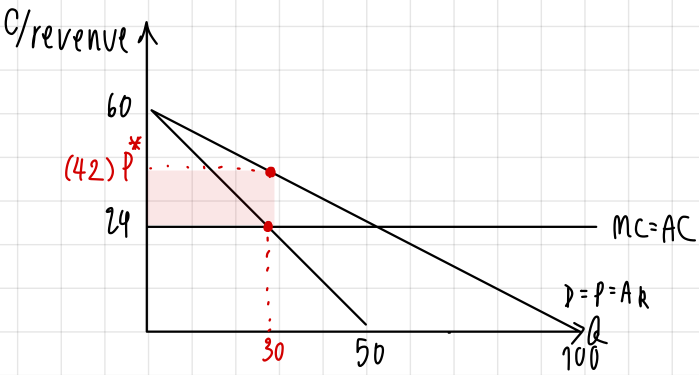


When supply ↑ , This leads to price drop in market.

This will increase the optimal quantity to maximize profit.

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

→ MR : $P = 60 - 1.2Q$ #



b) Profit-maximizing condition

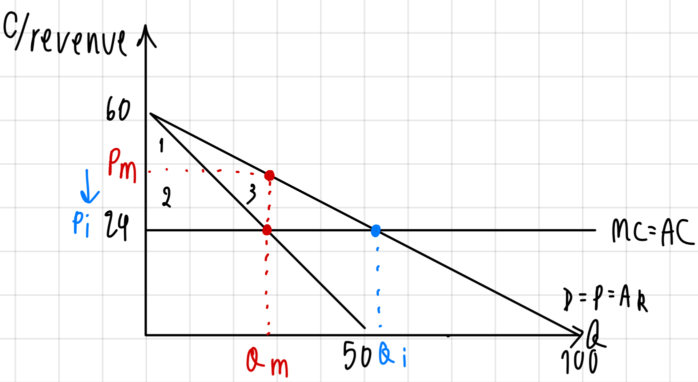
$MR = MC$
$60 - 1.2Q = 24$
$Q^* = 30$ units #

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

area shaded

∴ Profit (π) = $(P-C) \cdot Q = (42-24) \cdot 30 = 540$ MB.#

c)



• Ideal Price : P = MC
- quantity ↑ from Qm → Qi

• before intervention
CS = 1   PS = 2 (π)   DWL = 3

• after intervention
CS = 1+2+3   PS = -   DWL = -

∴ Intervention prevents HL from taking the advantages from consumer and removes the DWL.

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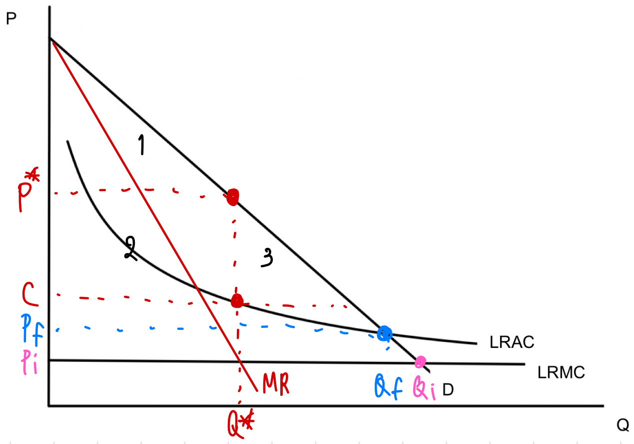
⑥ a)



Equilibrium Q* : MR = LRMC

CS = 1
DWL = 3
producer's profit = 2
↳ $(P^* - C) \cdot Q^*$

b) Lerner's index → $i = \frac{P - MC}{P} \Rightarrow \frac{50-10}{50} = 0.8$ #

c) Ideal Price → P = MC ⇒ 10\$ # (at Pi, Firm faces loss bc P<LRAC)

d) Fair Price → P = LRAC # (at Pf, no DWL bc firm is at normal profit)