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Pd" f" & isoquant

$Q = f(K, L)$, Q is constant.

$Q = K^{\alpha} L^{\beta}$ $\quad dq = 0$

↳ isoquant.

$dq = \frac{\partial f}{\partial L} dL + \frac{\partial F}{\partial K} \cdot dK$

$0 = \beta K^{\alpha} L^{\beta-1} dL + \alpha K^{\alpha-1} L^{\beta} dK$

$\beta K^{\alpha} L^{\beta-1} dL = \alpha K^{\alpha+1} L^{\beta} dK$

$\frac{dK}{dL} = -\frac{\beta}{\alpha} \frac{K}{L}$

$= -0.04$ (is creed pd").

$\frac{d^2K}{dL^2} = \frac{d}{dL}\left(-\frac{\beta}{\alpha}\frac{K}{L}\right) < 0.$

$\left(\frac{\beta}{\alpha} \frac{K}{L^2}\right) > 0$

$0 = \frac{\partial f}{\partial L} \cdot dL + \frac{\partial f}{\partial K} \cdot dK$

$-\frac{\partial f}{\partial K} \cdot -\frac{\partial f}{\partial K} dK = \frac{\partial f}{\partial L} dL$

$$\frac{\partial}{\partial L}\left(\frac{f_K}{f_L}\right) = -\left(\frac{\partial}{\partial L}\left(\frac{f_K}{f_L}\right) + \frac{\partial}{\partial K}\left(\frac{f_K}{f_L}\right)\right)$$

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$$\frac{dK}{dL} = \frac{-\partial f/\partial L}{\partial f/\partial K}$$

$$\frac{d^2K}{dL^2} = \frac{\partial}{\partial L}\left(\frac{-\partial f/\partial L}{\partial f/\partial K}\right)$$

$$= \frac{\partial f_K}{\partial K} \cdot \frac{\partial}{\partial L}\left(\frac{\partial f}{\partial L}\right)$$

$$\left(\frac{\partial f}{\partial K}\right)^2$$

$$f_L^2 - f_K^2 - 2f_L f_K$$

* Perfectly competitive market.

Shut down in short run :-

$P \geq AVC_{min} \rightarrow S > 0$

$P < AVC_{min} \rightarrow S = 0$

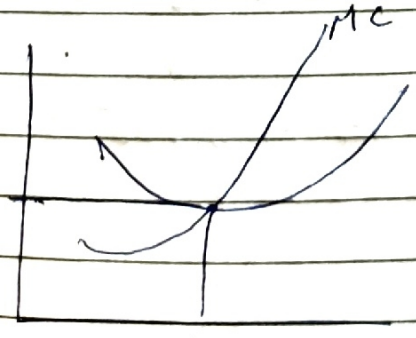
$C(q_i)$

$$TC = C(q_i) = 0.1q_i^3 - 2q_i^2 + 15q_i + 10$$

↓ Fixed cost

$$TUC = 0.1q_i^3 - 2q_i^2 + 15q_i$$

$$AVC = \frac{TUC}{q} = 0.1q_i^2 - 2q_i + 15$$



Step 1 : Calculate AVC → AVC_{min}

$$MC = \frac{d(TC)}{dq}$$

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$P = MC$

$\Rightarrow .3q_i^2 - 4q_i + (15 - P) = 0$

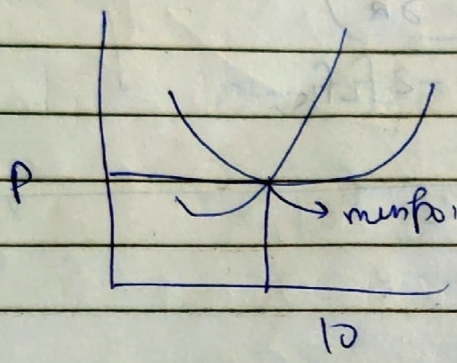
$$x_1, x_2 = \frac{4 \pm \sqrt{16 - 1.2(15-P)}}{.6}$$

Supply $\cdot \quad .1q_i^2 - 2q_i + 15 = AVC$

↕

Put $q_i = 10$ · we will get price

$P = 5$



$P \geq 5$

$P > 5 \quad \cdot S > 0$

$P < 5 \quad S = 0.$

Sup $\cdot \quad q_i = \frac{4 + \sqrt{16 - 1.2(15-P)}}{.6}$

$P = MC$

for this

Q. $C_{1i} = .04q_{1i}^3 - 0.8q_{1i}^2 + 10q_{1i}$

$C_{2i} = .04q_{2i}^3 - 0.8q_{2i}^2 + 20q_{2i}$

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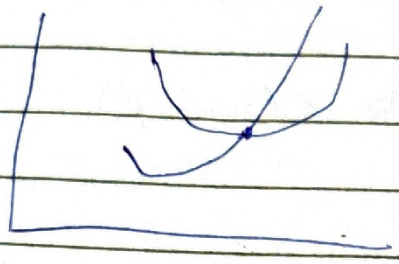
$AVC_1 = \frac{C_{1i}}{q_i} = .04\, q_{1i}^2 - 0.8\, q_{1i} + 10$

$AVC_2 = \frac{C_{2i}}{q_i} = .04\, q_{2i}^2 - 0.8\, q_{2i} + 20.$



$.08\, q_i = 0.8$

$q_i = 10.$

$.08\, q_{2i} = 0.8$

$q_{2i} = 10.$

min. both at q_{1i} & q_{2i} at 10.

$P_1 = .04 \times 100 - 0.8 \times 10 + 10$

$P_2 = .04 \times 100 - 0.8 \times 10 + 20$

$P_1 = 4 - 8 + 10$

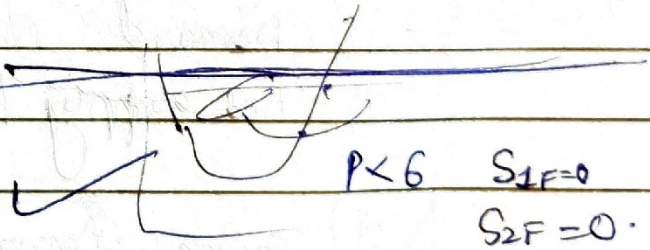
$P_2 = 4 - 8 + 20$

$P_1 = 6$

$P_2 = 16.$

X $P_1 \geq 6$ $S > 0.$

$P < 6$ $S = 0$



$P < 6$ $S_{1F} = 0$

$S_{2F} = 0.$

$6 \leq P < 16 \rightarrow S_{F1} > 0$

$S_{F2} = 0$

$P > 16$; $S_{F1} > 0$, $S_{F2} > 0$

Firm produces at $P = MC$

$P = \frac{d(TC)}{dq}.$

$P_1 = .12\, q_{1i}^2 - 1.6\, q_{1i} + 10$

$P_2 = .12\, q_{2i} - 1.6\, q_{2i} + 20.$

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- $\pi = .12 q_{1i}^2 - 1.6 q_{1i} + (10 - P)$
- $\pi = .12 q_{2i}^2 - 1.6 q_{2i} + (20 - P)$

$1.6 \times 1.6 - 4 \times .12 \times (10 - P_1)$

$1.6 \times 1.6 - 4 \times .12 \times (20 - P)$

$$q_i = \frac{1.6 \pm \sqrt{2.56 - .48(10 - P_1)}}{.24}$$

$$q_2 = \frac{1.6 \pm \sqrt{2.56 - .48(20 - P_2)}}{.24}$$

Q Cost function is given as $C = q_i^3 - 4q_i^2 + 8q_i$

Firms will enter if profit is positive & exit if negative

Demand

1) Find supply f^n (rel^n b/w quantity & price)

2) Given demand

$$D = 2000 - 100P$$

Determine the eq. price quantity & no of firms that are operating in the industry

600

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min point of ~~AC~~ AVC will give you the price level

① $\frac{dC}{dq_i} = Q = 3q_i^2 - 8q_i$

② $AC = \frac{TC}{q} = q_i^2 - 4q_i + 8.$

$\frac{d(AC)}{dq_i} = 0 = q_i - 2$

$q_i = 2.$

$P = 4.$

each firm producing 2, how many firms required = 800

Ans.

$\frac{d(AC)}{dq_i} = 0.$

↳ we get the quantity produced by single firm

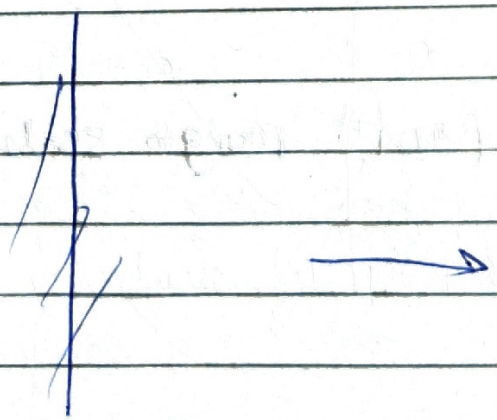
* Also check double derivative condition in exam to show this point is minima.

$D = 2000 - 100(P)$

$D = 2000 - 400$

$= 1600.$

$n \times \text{Supply} = \text{total demand}$ $n = 800$



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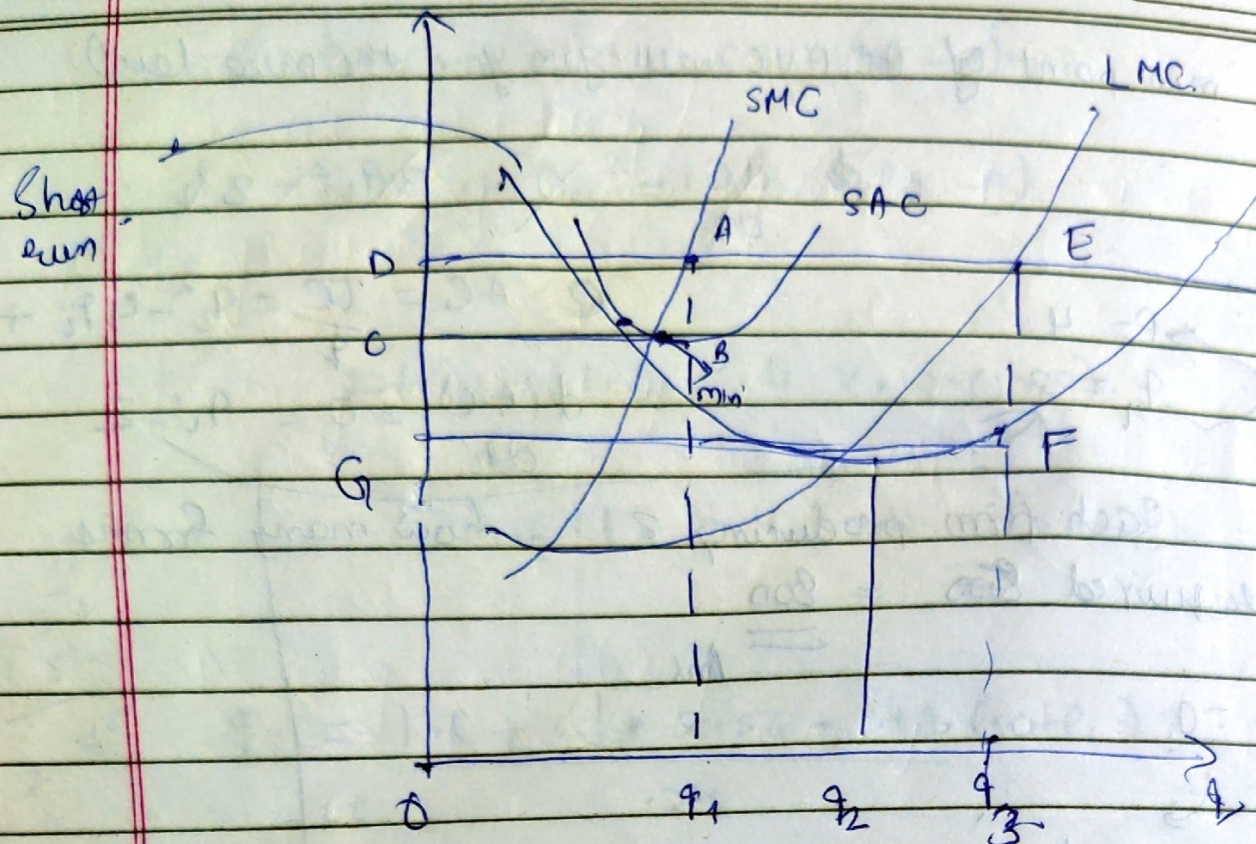

TC = O

TC = CBOq_1

TR = ODAq_1

$TC_{long\ run}$ = OGFq_2.

$TR_{long\ run}$ = ODEq_2.

~~Margin~~ q_{mp} :- profit margin scaled from AB to EF.

Rent
CS (Consumer surplus)
PS (producer surplus)

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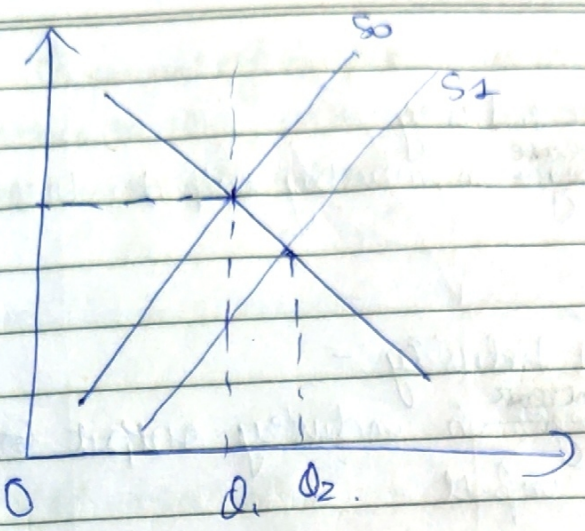

when more firms enter the market supply curve shifts to the right.

Suppose more firms are entering. So supply curve shifts to right & price falls. It falls to such an extent that economic profit is 0. but accounting profit will still be > 0 due to low opportunity cost

Effluent fee. (Case Study)

* Isoquant
* Isocost
* elasticity of substitution = $\frac{\%\text{ change (RL)}}{\%\text{ change}}$

price of the competition :- Although a firm producing at q_3 is at profit but after more firm enters. they go in loss & may have to pay the price of the competition.

Industrial Long Run Supply Curve :-

Shape of the long run industrial supply curve depends on the extent to which changes in industry output affect the prices that firms must pay for inputs into the production process.

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Unskilled labour

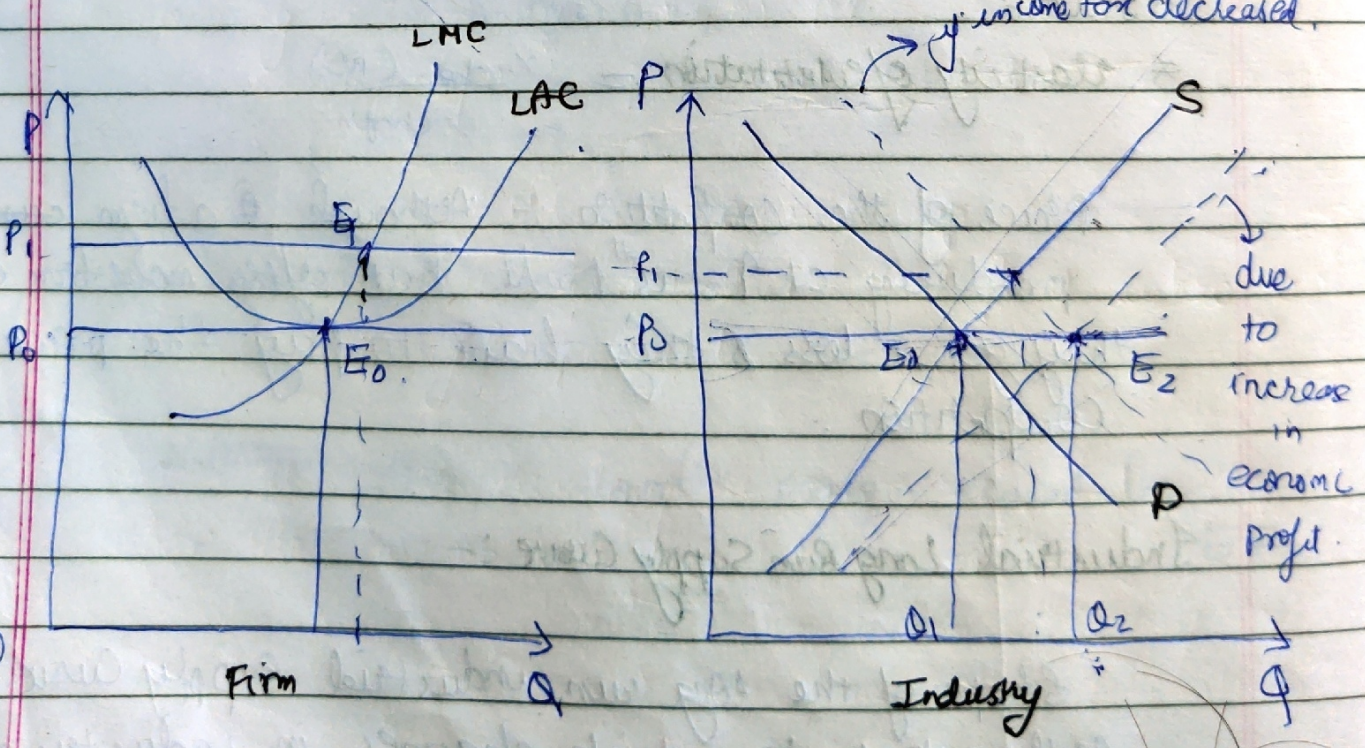
Skilled labour

1) Constant cost Industry :-
→ ~~Changes~~ Increase in industry output does not change the prices of inputs.

2) Increasing cost Industry :-
→ ~~Changes~~ Increase in industry output (↑ses) prices of input.

3) Decreasing cost Industry
→ Increase in industry output (↓ses) prices of input.

what is the shape of Industrial long run supply curve in case of Constant cost Industry.



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when Q_1 amount of output was being produced, after we increase to Q_2, still per unit of production is same, because unskilled labors are not good at bargaining.

Again equilibrium comes to ~~the~~ E, but with more no of firms.

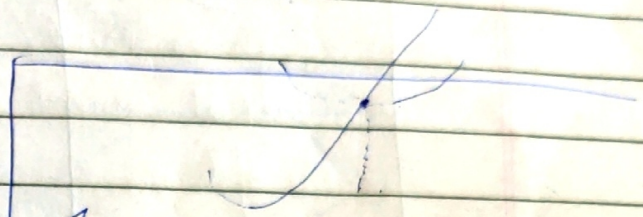
Q $TC = q^3 - 8q^2 + 30q + 5$

$\frac{TC}{q} = q^2 - 8q + 30$

$AVC = q^2 - 8q + 30.$

$\frac{d(AVC)}{dq} \quad 2q - 8 = 0$

$\boxed{q = 4}$



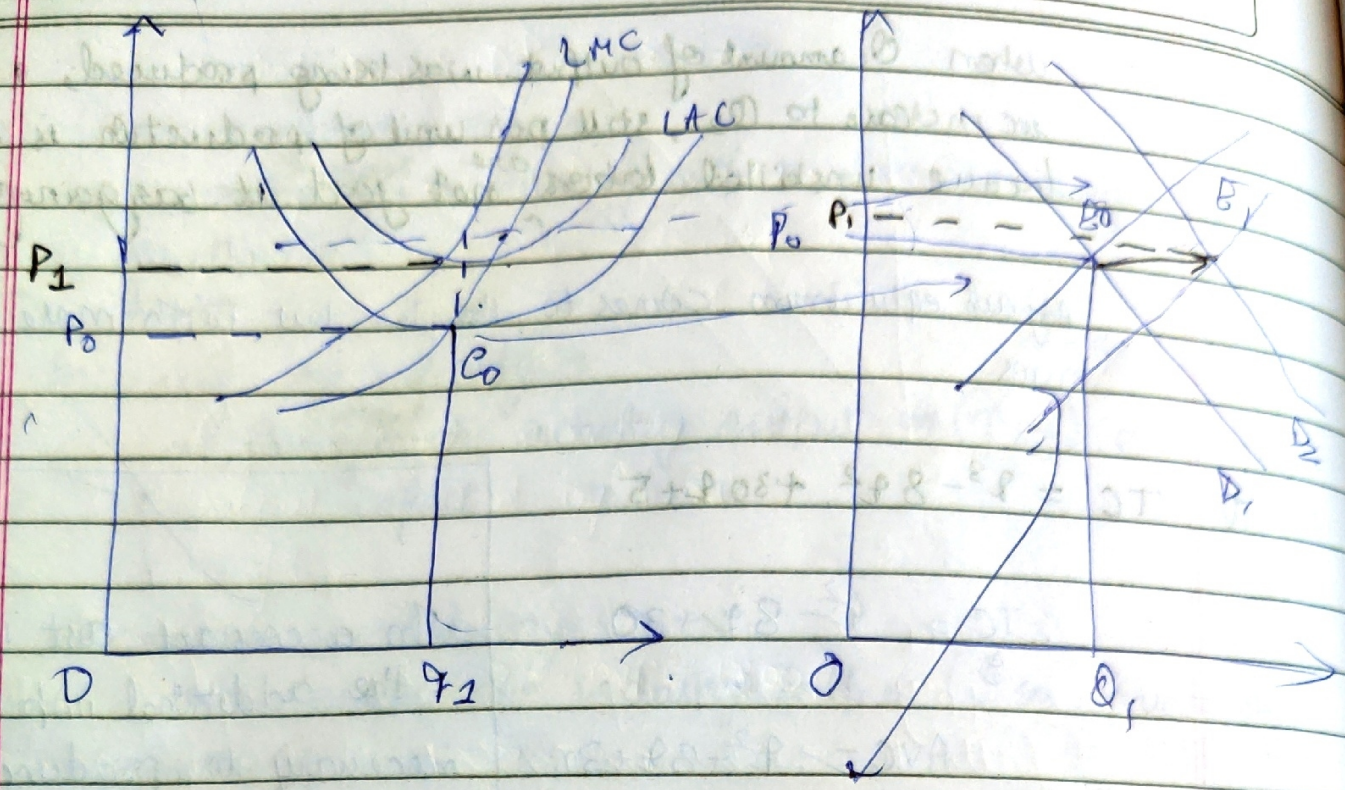
In a constant cost industry, the additional inputs necessary to produce a higher o/p can be purchased without ~~do~~ increase in per unit price

$\frac{d^2(AVC)}{dq^2} \quad 2 > 0$ (minima).

$3q^2 - 16q + 30 = q^2 - 8q + 30$

$2q^2 = 8q \quad \boxed{q = 4}$ ~~q = 4~~

→



Supply curve will not go more deeper because it has to shift till price P1, below which firms have <0 economic profit.

In increasing cost industry, D(↑) P(↑).

By defⁿ :- per unit cost (↑) as (O/P)(↑)

AC & MC curve shifts up.

Long run eqlbᵐ is reached at that point where zero eco. Π (profit) prevails.

Firms will enter as long as eco Π > 0, and it stops when there are no more eco Π i.e. at P1.

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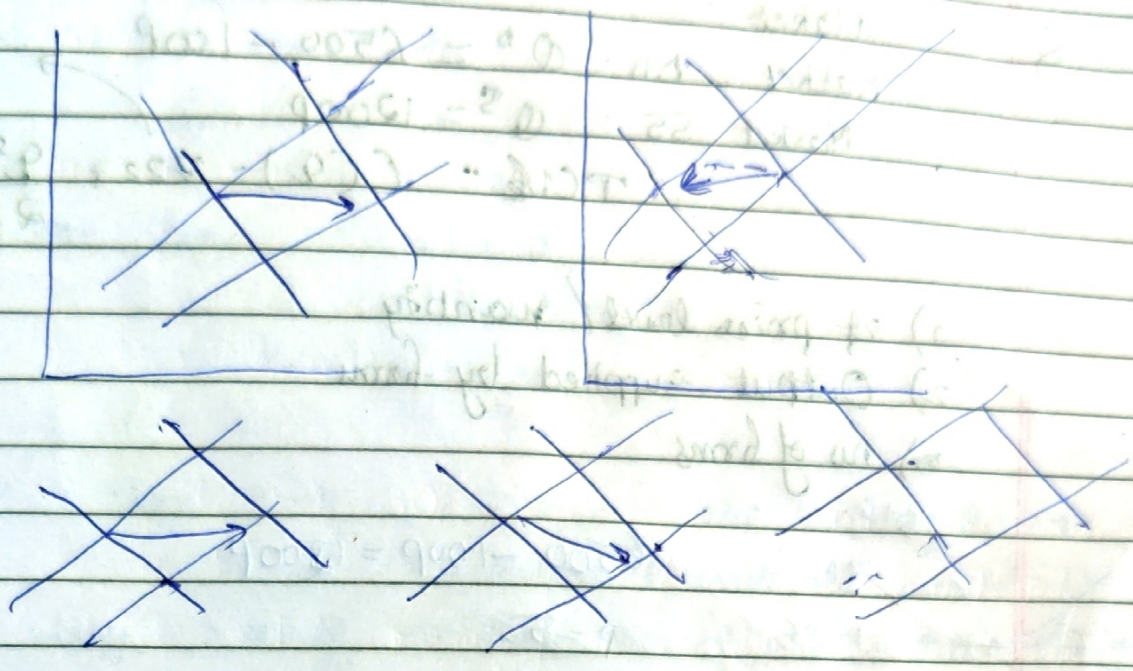
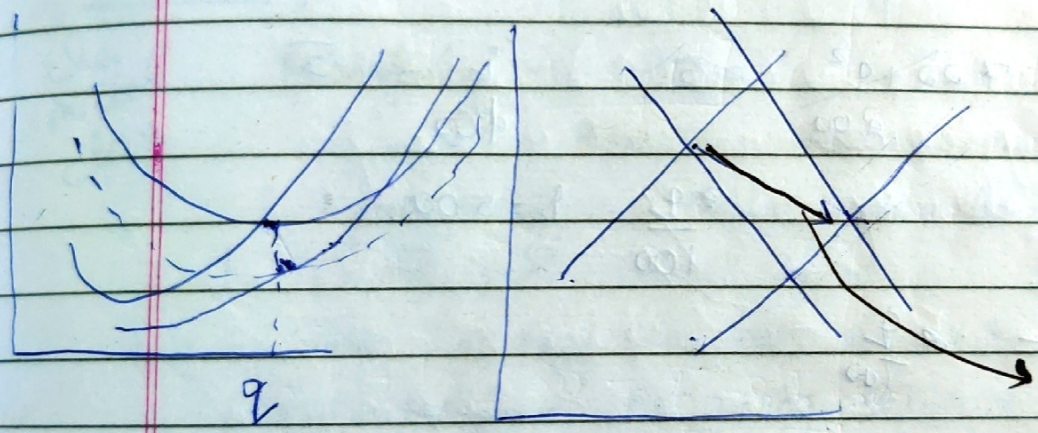
3. Decreasing Cost industry :-





when per unit cost of pdⁿ ↓ supply increases. because profitable industry.

long run supply curve.

Economic Scale :-

Increasing → Decreasing cost scale
Decreas → * Increasing cost scale.

→ Question of short run

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Market DD : $Q^D = 650$

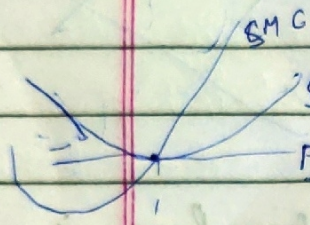
8) ~~Maket~~

Market DD : $Q^D = 6500 - 100P$

Market SS : $Q^S = 1200P$

TC(q) = $722 + \frac{q^2}{200}$ → fixed cost is this

1) eq price level / quantity
2) Output supplied by firms
3) no of firms



$6500 - 100P = 1200P$

$P = 5$

$722 + \frac{q^2}{200} = 5$

$\frac{2q}{200}$ $q = 500$.

$P = MC$

$5 = \frac{2q}{200}$

2) $1200 \times 5 = 6000$.

3) $\frac{6000}{500} = 12$ firms.

O Would you expect to see entry of one firm in the long run?

Depends on economic profit if less than 0 then leave, else if greater than 0 enter the market

~~P = MC~~

Check in long run, equilibrium conditions.

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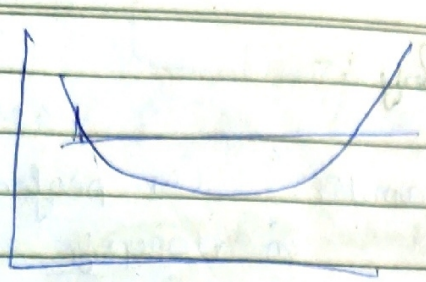

Iso cost line $C = wL + rK$

$$K = \frac{C}{r} - \frac{wL}{r}$$

Slope $= w/r$. If given one unit of labor how much units of capital to buy i.e $\frac{w}{r}$ to keep cost of production same

→

One missed last

Monopoly :-

Reasons why someone is in monopoly.

Lobbying → try to incline govt, so it works acc. to you

1. Control over critical inputs.

~~Te~~ J.O ran on a test server & was not supposed to pay to the govt. for giving services.

2. Technical Barriers :-

$$Q\ (\uparrow) = AC / MC\ (\downarrow)$$

3 Legal Restriction

Defense
electricity