Question # 01

Part (a) Compute price Elasticity of demand.

sol/ Demand function = $y(p) = p^{-b}$

cost function = $c(y) = \frac{1}{2}cy^2$

Here we will take derivative of cost function and Demand function.

i.e. $dy = cy$

$dp = -bp^{-b-1}$

price Elasticity of demand = $\epsilon = \frac{dy \cdot p}{dp \cdot y}$

$$\epsilon = \frac{cy \cdot p}{-bp^{-b-1} \cdot y}$$

$$\epsilon = \frac{cy^{1-1} \cdot p^{1-(-b-1)}}{-b}$$

$$\epsilon = \frac{c \cdot p^{1+b+1}}{-b}$$

$$\epsilon = \frac{c \cdot p^{2+b}}{-b}$$

When $p=0$, the Elasticity of demand is zero.

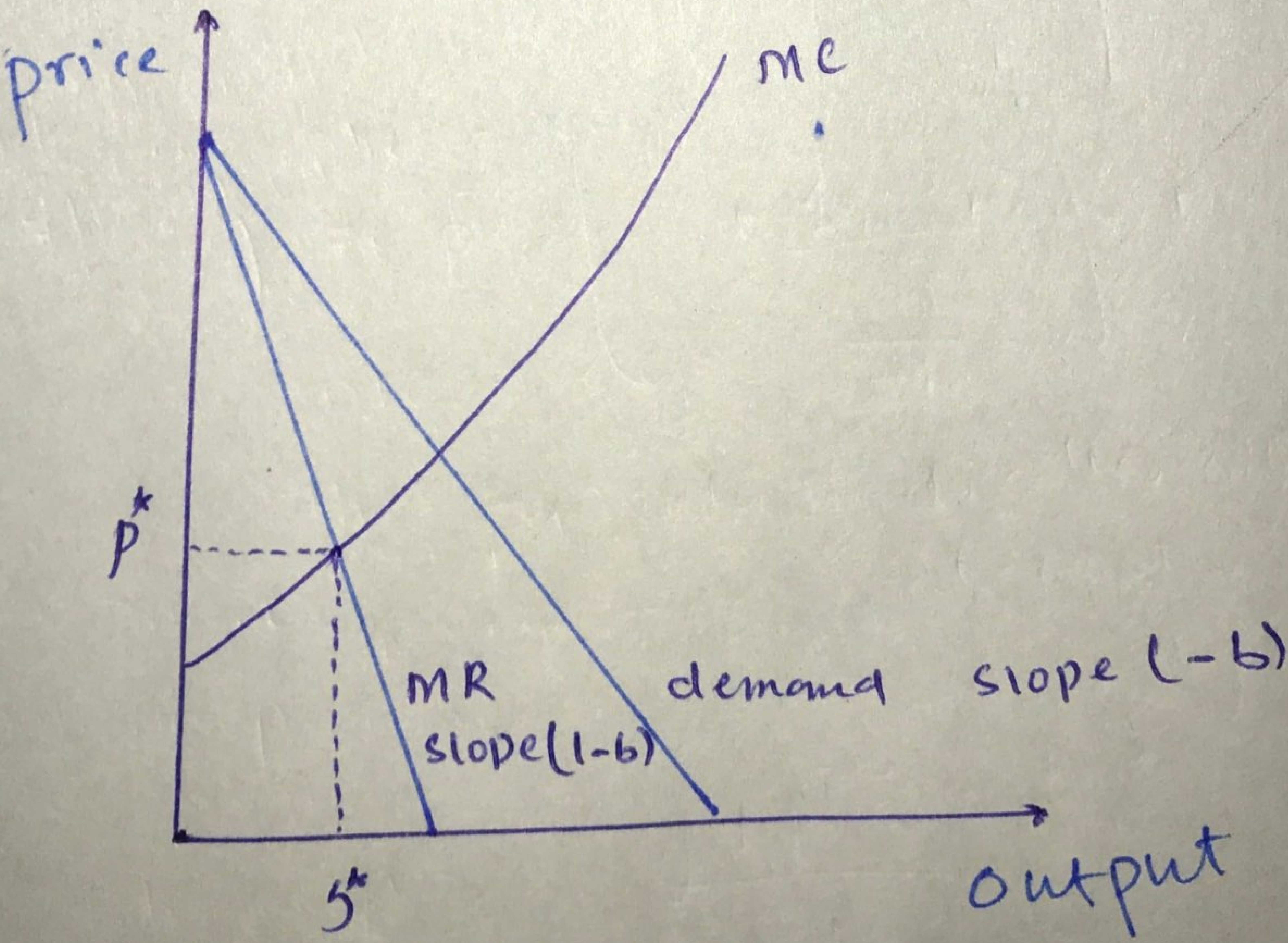
When $b=0$, the elasticity of demand is (negative) or Infinity (undefined)

Question #1

part (b)

Hence $MC = cy$

$MR = (1-b)p^{-b}$



Part(c) Calculate the price and Output level ---

demand function $= y(p) = p^{-b}$

cost function $= c(y) = \frac{1}{2}cy^2$

Revenue function $= r(y) = y(p) \cdot p$

$= p^{-b} \cdot p$

$= p^{1-b}$

Marginal Revenue(p) $= (1-b)p^{-b}$

Marginal cost(y) $= cy$

As profit maximization condition is $MR = MC$.

then $MR = MC$

$(1-b)p^{-b} = cy$

•) Now solving for price p

$p^{-b} = \frac{cy}{1-b}$

$p^{-1} = \left(\frac{cy}{1-b}\right)^{1/b}$

$$\boxed{p = \sqrt[-b]{\frac{cy}{1-b}}}$$

•) Now for output

$cy = (1-b)p^{-b}$

$y = \frac{(1-b)p^{-b}}{c}$

The optimal output y, is where marginal revenue curve Intersects Marginal cost curve. The monopolist will then charge the maximum price it can get at this output. Here we have taken derivative of Revenue funtion to calculate Marginal Revenue, and found Marginal cost function by taking derivative of cost function.

Question #1

part (a) Find the Markup ---

$$mc(y) = y(p)\left[1 + \frac{1}{\epsilon(y)}\right]$$

$$mc(y) = p^{-b}\left[1 + \frac{1}{\frac{c \cdot p^{2+b}}{-b}}\right]$$

$$MC = cy = p^{-b}\left[1 + \frac{1}{\frac{c \cdot p^{2+b}}{-b}}\right]$$

This formula Indicates that market price is a markup over marginal cost, where the amount of markup depends on elasticity of demand.

$$\text{markup} = \frac{1}{1 + \frac{1}{\frac{c \cdot p^{2+b}}{-b}}}$$

$\Rightarrow$ Hence the demand function $y(p) = p^{-b}$ where $b > 1$, so we can conclude that the Elasticity of demand for this function will alway be negative.

Hence the Elasticity of demand is negative so the markup price will decrease.

Question # 1

part (e) find the price --

To eliminate the deadweight loss we will compute marginal cost equal to price. To set as price where the marginal cost curve crosses the demand curve.

Hence we have marginal cost

$MC = cy$

and we have demand curve

$c(y) = p^{-b}$

Then $cy = p^{-b}$ And $MC = c(y)$

$= p^{-b} = cy$

$$\boxed{p = \frac{1}{\sqrt[b]{cy}}}$$

price where dead weight loss is zero

Now for y (output)

$cy = p^{-b}$

$$\boxed{y = \frac{p^{-b}}{c}}$$

This is the output where deadweight loss is minimum.

Question # 02

Part (a)

Min $C = wL + rK$ s.t $y = K^{1/2} L^{1/2}$

making langrangian

$\mathcal{L} = wL + rK + \lambda (y - K^{1/2} L^{1/2})$

Applying F.O.C

$$\frac{\partial \mathcal{L}}{\partial L} = w - \frac{1}{2} \lambda K^{1/2} L^{-1/2} = 0$$

$$\Rightarrow w = \frac{1}{2} \lambda K^{1/2} L^{-1/2} \rightarrow (I)$$

$$\frac{\partial \mathcal{L}}{\partial K} \Rightarrow r - \frac{1}{2} \lambda K^{-1/2} L^{1/2} = 0$$

$$r = \frac{1}{2} \lambda K^{-1/2} L^{1/2} \rightarrow (II)$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = y - K^{1/2} L^{1/2}$$

$$y = K^{1/2} L^{1/2} \rightarrow (III)$$

Dividing (I) and (II)

$$\frac{w}{r} = \frac{\cancel{1/2} \, \cancel{\lambda} K^{1/2} L^{-1/2}}{1/2 \, \cancel{\lambda} K^{-1/2} L^{1/2}}$$

$$\frac{w}{r} = \frac{K^{1/2} L^{-1/2}}{K^{-1/2} L^{1/2}}$$

$$\frac{w}{r} = \frac{K^{1/2 + 1/2}}{K^{1/2 + 1/2}} \Rightarrow \frac{w}{r} = \frac{K}{L}$$

$$wL = rK \Rightarrow L = \frac{rK}{w} \rightarrow (IV)$$

put (IV) into (III)

$$y = k^{1/2}\left(\frac{rk}{w}\right)^{1/2}$$

$$y = k^{1/2+1/2} \cdot \frac{r^{1/2}}{w^{1/2}}$$

$$y = k\left(\frac{r}{w}\right)^{1/2}$$

$$k^* = y\left(\frac{w}{r}\right)^{1/2} \rightarrow \text{(V)}$$

put (V) into (IV)

$$L = \frac{r}{w}\left(y\left(\frac{w}{r}\right)^{1/2}\right)$$

$$L = y\,\frac{r^{1-\frac{1}{2}}}{w^{1-1/2}}$$

$$L^* = y\left(\frac{r}{w}\right)^{1/2} \rightarrow \text{(VI)}$$

L^* and k^* are the cost minimizing input functions.

Question #02
part (b)

The minimum cost function is computed by subtracting the cost minimizing input functions into the cost equation

Thus

$$C_{min} = wL^* + rK^* \rightarrow (A)$$

substituting L^* and K^* in (A)

$$C_{min} = w\left(y\left(\frac{r}{w}\right)^{1/2}\right) + r\left(y\left(\frac{w}{r}\right)\right)^{1/2}$$

$$C_{min} = y r^{1/2} w^{1-1/2} + y r^{1-1/2}$$

$$C_{min} = y\sqrt{rw} + y\sqrt{rw}$$

$$C_{min} = 2y\sqrt{rw}$$

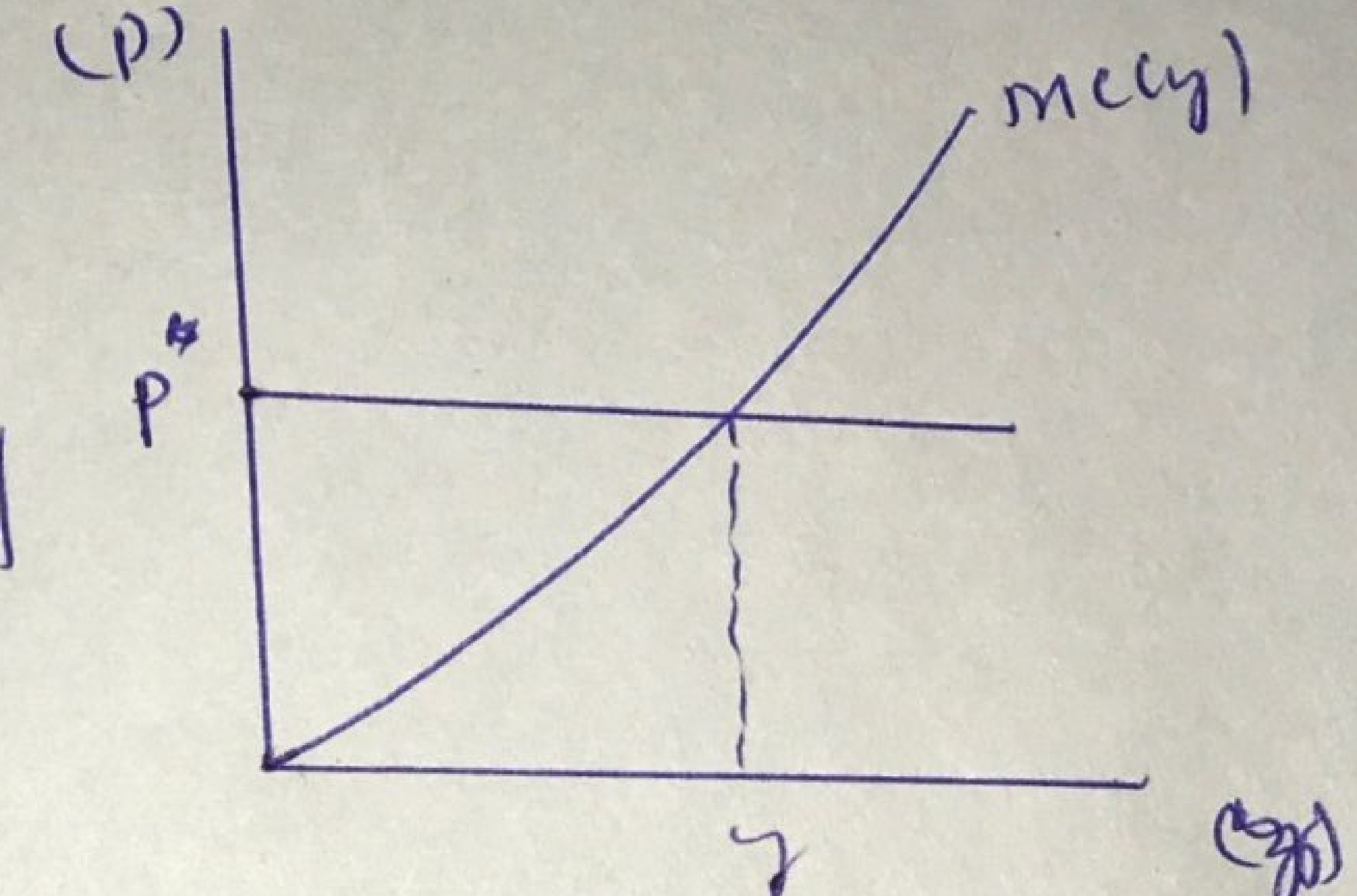
Question (02)
part (c)

In perfect compitition firms choose their level of output to equate marginal cost with the price. This means that the price charged is equal to the marginal cost

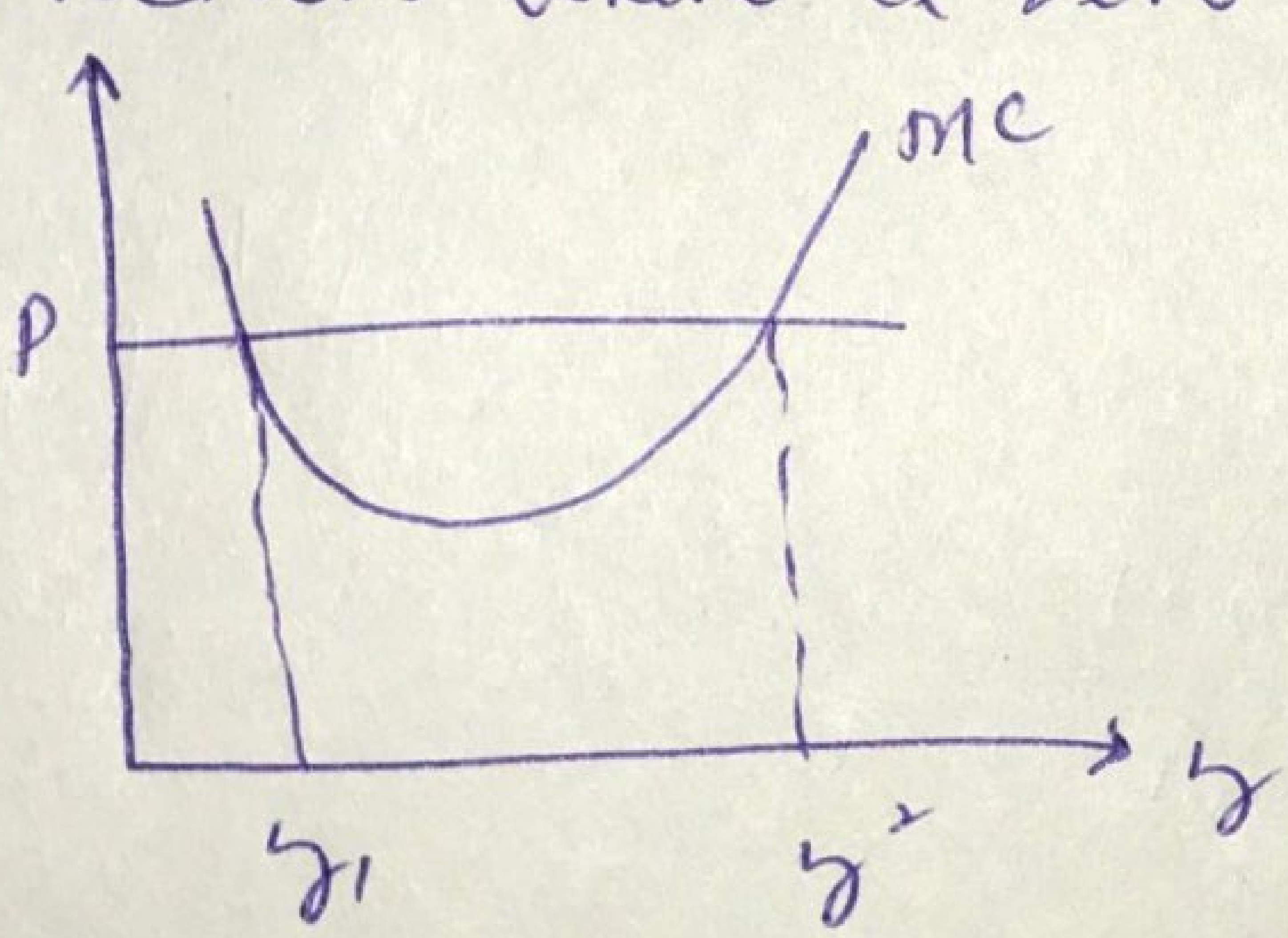
ie

$P = MC$

Graphically



However in some cases the marginal cost has two interpretations where a zero solution is also possible



Since the firm will never be on downward sloping part of marginal cost, a rise in P has lead to rise in y.
hence suppy curve must slope upward.
therefore y_2 is always considered better then y_1, This point leads to a non zero solution.

Q # 02
part (e)

factors effeting consumers demand.

=) w (price of Labor), is the level of the income of the consumer. Consumer demand is Influenced by the size of income of an individual. The higher the wage of the labor 'w' there will be Increase in the demand for good and services Increasing level of income will rise the purchasing power in the economy as a whole.

=) r (price of capital) is the cost producer is Bearing for producing a desired product, rise in price of capital will Increase the expenditure of producing goods. thus producer will Increase the price and consumer demand will decline due to the rise in price level.

Question 02

part (f)

When the firm cannot adjust its level of capital in the short run, and when the capital is fixed at $\bar{k}$ then the firm marginal cost function will be above when AC is increasing and below the MC decreasing when MC is

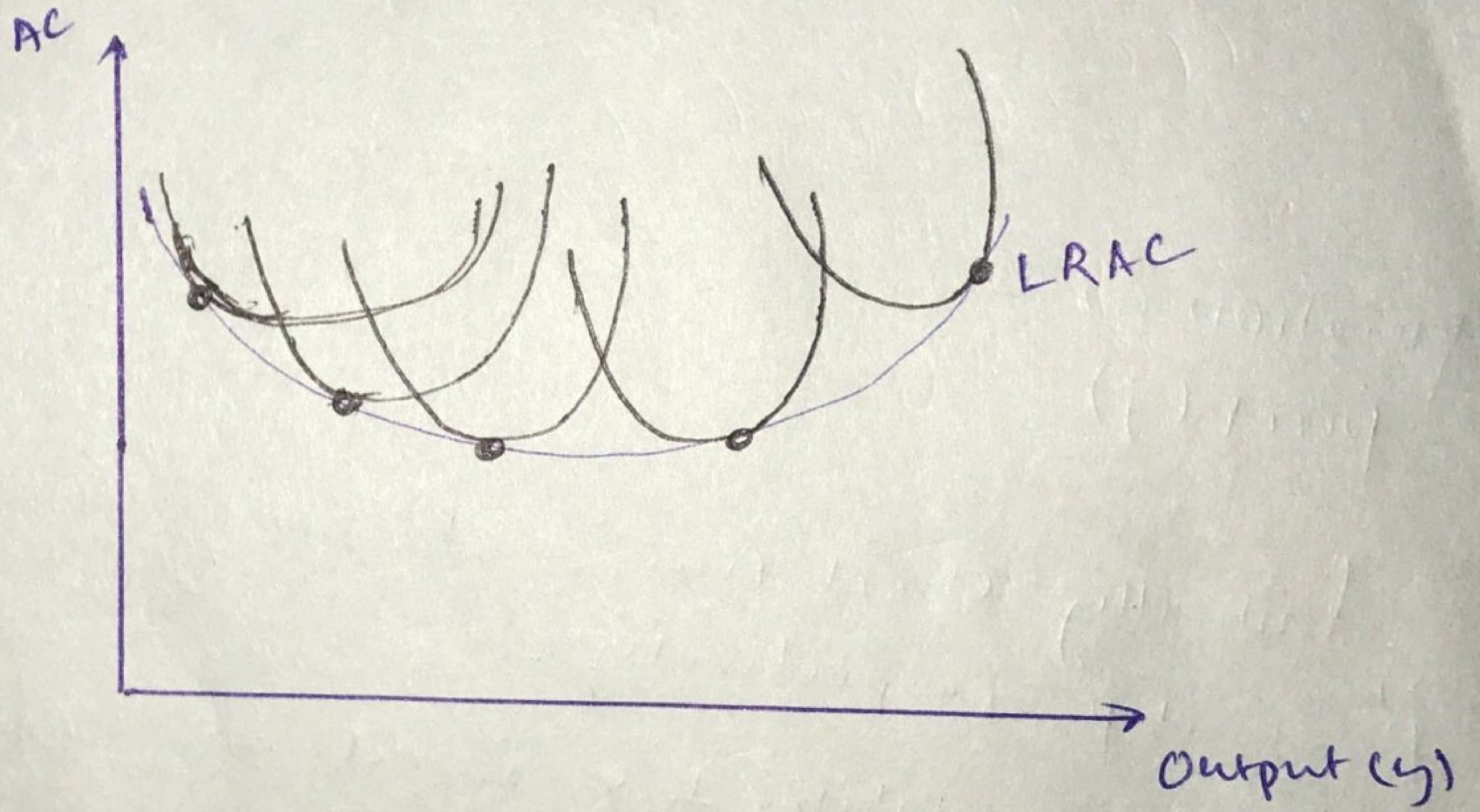
There is a relationship between MC and Cv

$$MC(y) = \frac{dc_v}{dy}$$

When only x_m is fixed in short run.

Question # 02
part (g)

Long run average cost curve will be the lower envelope of the short run Average cost, The SRAC always is atleast as larger as the long RAC. and they are the same at the level of output where the longrun demand for the fixed facter equal that amount of the fixed facter that you have.



Hence we can see in the graph, there are saveral points where long run Avg cost curve Intersects short Run Avg cost curve

Question # 02

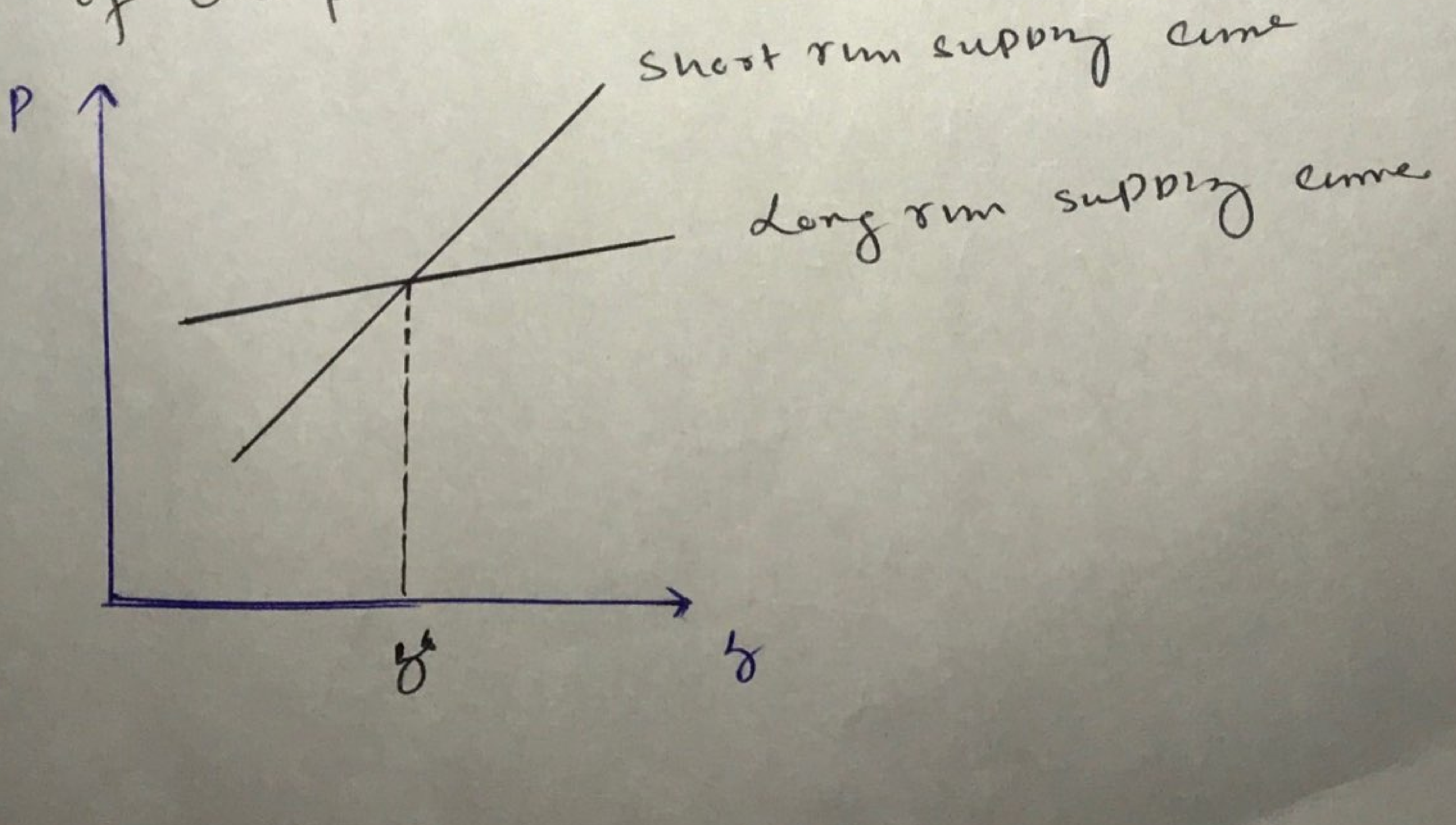
part (H)

⇒ The long run supply curve will be the upward sloping part of long run marginal cost curve that lies above the average cost curve.

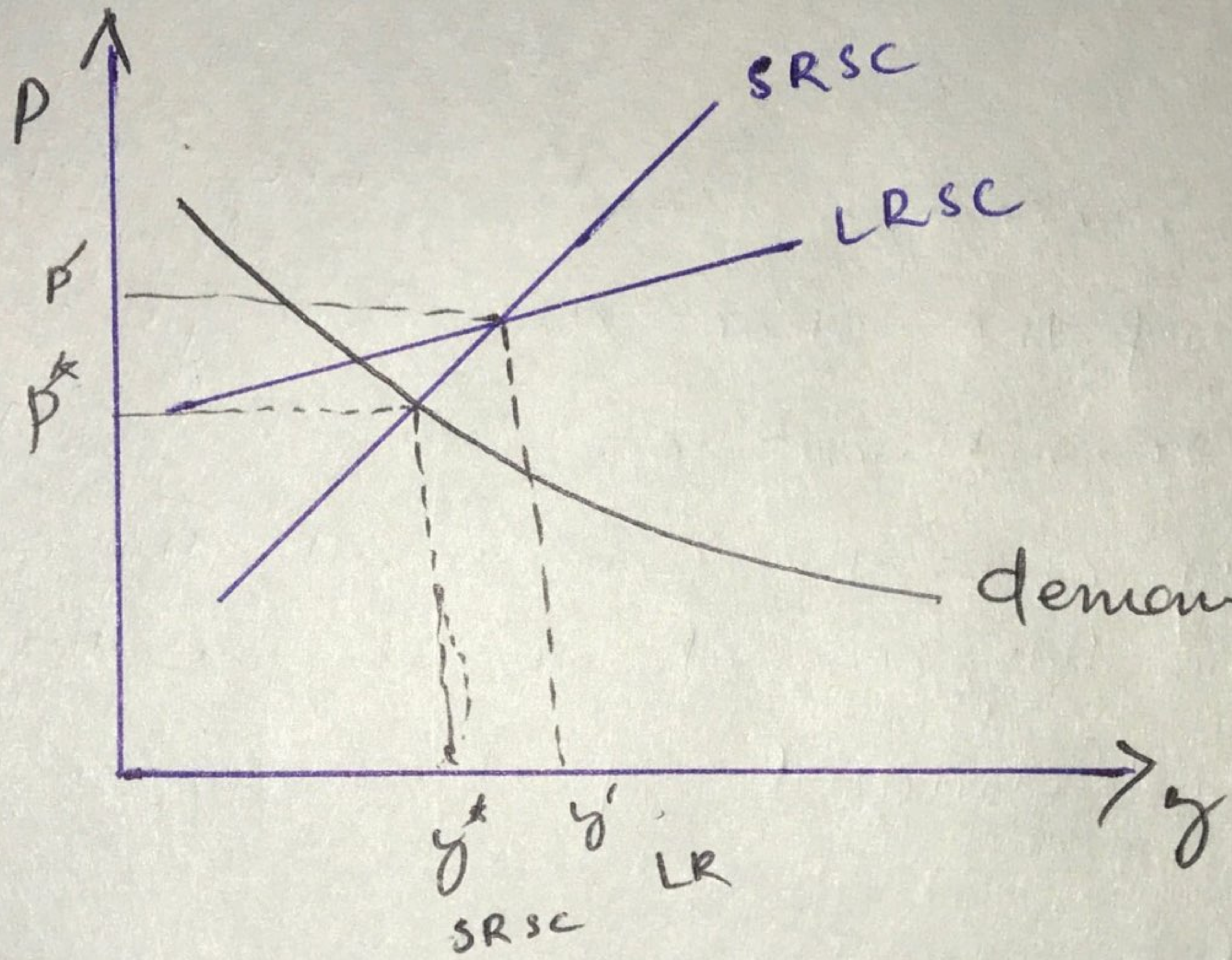
⇒ And the short run supply curve is linearly upward sloping. There is no any big difference between the long run supply curve and short run supply curve. The only difference is short run supply curve is more steeper than long run supply curve.

⇒ Long run supply curve exibits constant Returns to scale.

⇒ The short run supply curve involves marginal cost of output holding $\bar{K}$ fixed at a given level of output while long run supply curve involves the MC of output.



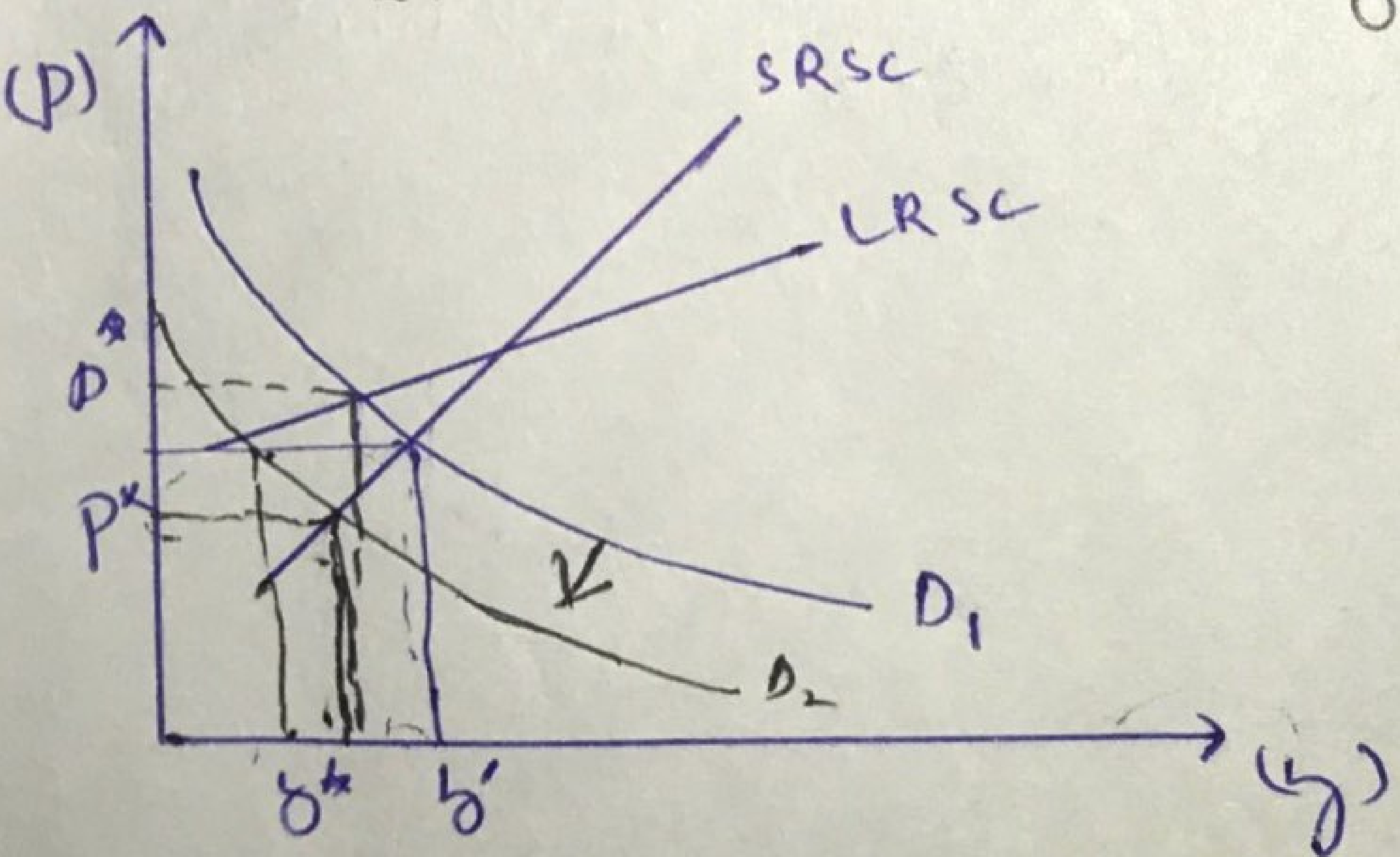
Question or
part (i)



Question 02
part (j)

Initially short run and long run prices are p^* and p' respectively.

When quantity tax levied on consumer / firm in short run then the graph will be..



Hence we can conclude from the graph that the effect of quantity tax is greater in the long run.

Question # 03

1- TRUE

2- FALSE

3- TRUE

4- FALSE

5- TRUE

6- TRUE

7- FALSE

8- FALSE

9- FALSE

10 - TRUE