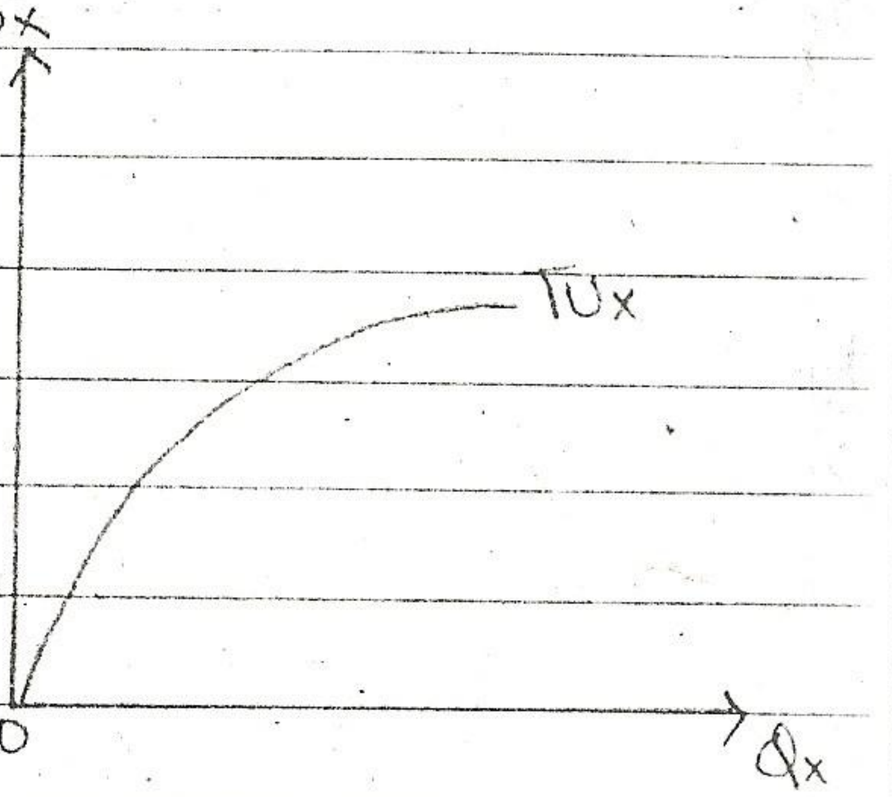
Consumer Theory

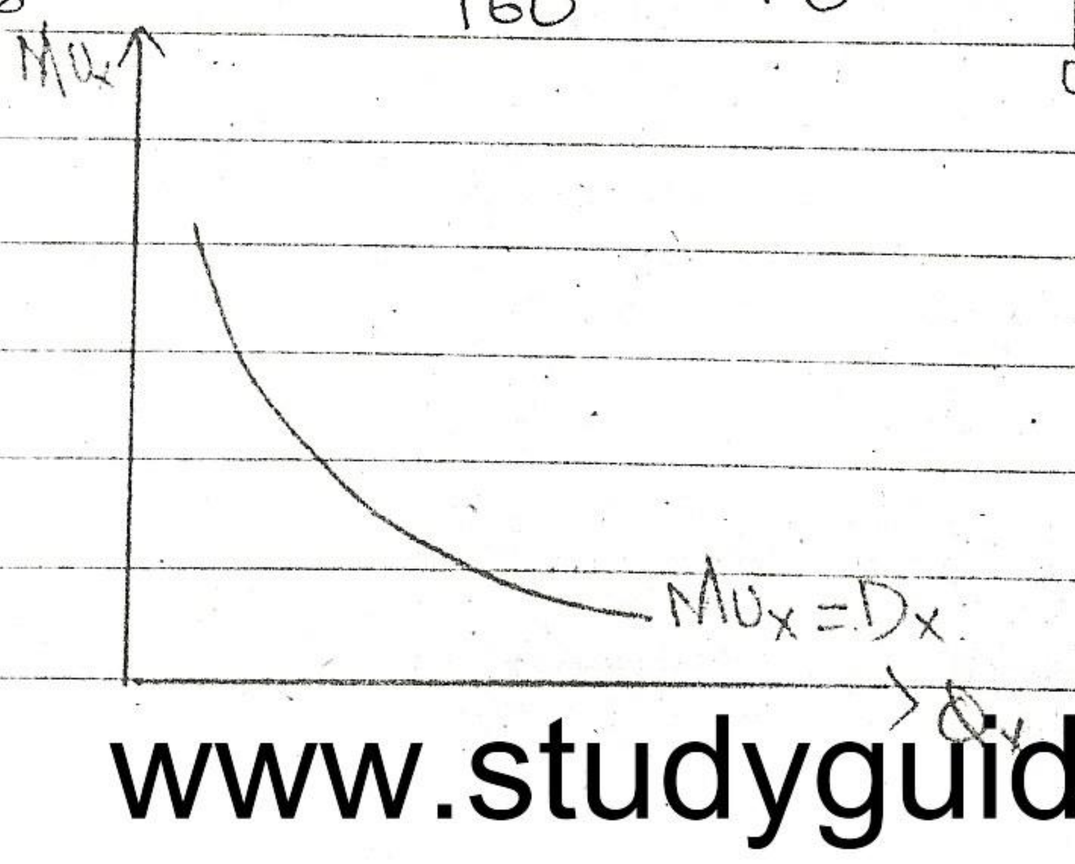
- Law of diminishing marginal utility
- Budget lines and indifference curves
- Consumer equilibrium
- Derivation of individual demand curves for normal inferior and different goods.

⇒ Law of Diminishing Marginal Utility.

The law of diminishing marginal utility that as we consume successive units of a good, the total utility increases at a decreasing rate but the marginal utility for each successive unit declines.

unit of X	TU_x	MU_x
1	40	
2	75	35
3	105	30
4	130	25
5	150	20
6	160	10





The downward sloping marginal utility function is what underlies the downward sloping demand curve, because it suggests that as an individual consumes successive units of a good MU from each successive unit falls and therefore the price he is willing to pay for each unit will also fall. This is based on the assumption that consumer is rational and he is able to equate the marginal utility he derives to the price he is willing to pay. The assumption of rational consumer has come under criticism because of the following problems:

~~fc~~.

- a rational consumer makes his decision on the basis of perfect knowledge which only exists in the model of perfect competition. In a real world markets are imperfectly competitive and sometimes the flow of information is ~~ret~~ restricted. Another important factor is advertising which can both compliment and undermine the law of diminishing marginal utility depending on its nature. If adverticing is informative than it will add to the knowledge base of consumer making him more rational and thus complimenting the law of diminishing marginal utility. However, advertising is often persuasive which often makes consumers irrational and compulsive and this tends to undermine the Law of DMU.

- secondly utility is a mental phenomenon and its not always possible to quantify utility into units called utils. There is also an important difference b/w ordinal and cardinal utility. Cardinal utility will help individual rank preferences, for example, individual prefers option A to option B and optionB to optionC etc, but it doesnt tell by how many utility units option A is better than option B and option B is better than option C.. The main problem with cardinal utility is that an option can be preferred to itself which is highly irrational. For example if an individual has to make a choice b/w a concert and a dinner and he ends up opting for ~~dinner~~ concert. In the next situation he has to make a choice b/w dinner and a fashion show and we assume that he opts for the dinner. Finally if he has to make a choice b/w going to a concert and going to a fashionshow and if he opts for a fashion show, then it follows that ~~it~~ concert is preferred to itself. Such a set of preferences will be intransitive and lack completeness. This problem undermines rationality and weakens the law of DMU

$A > B > C \rightarrow A > C$

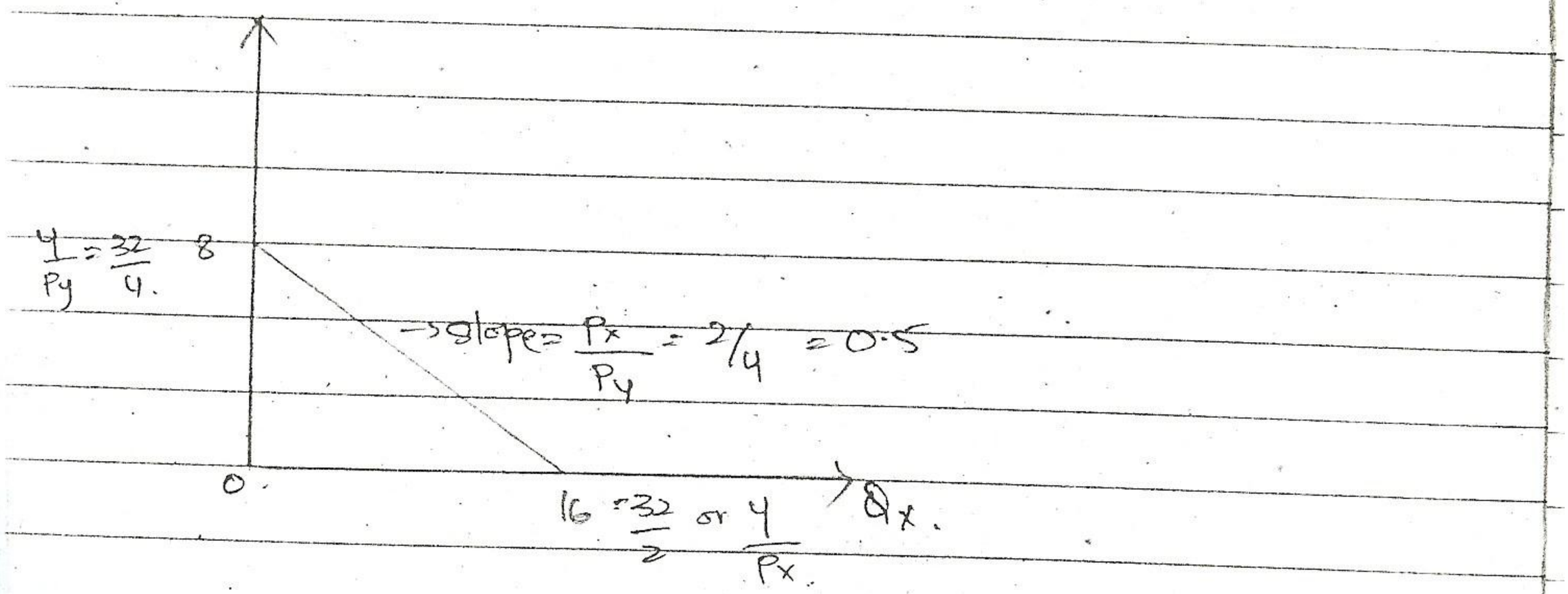
$A \infty B \infty C \rightarrow$ (A) is not necessarily preferred to (C)

⟹ Budget Line

Consumer income (per week) = $32

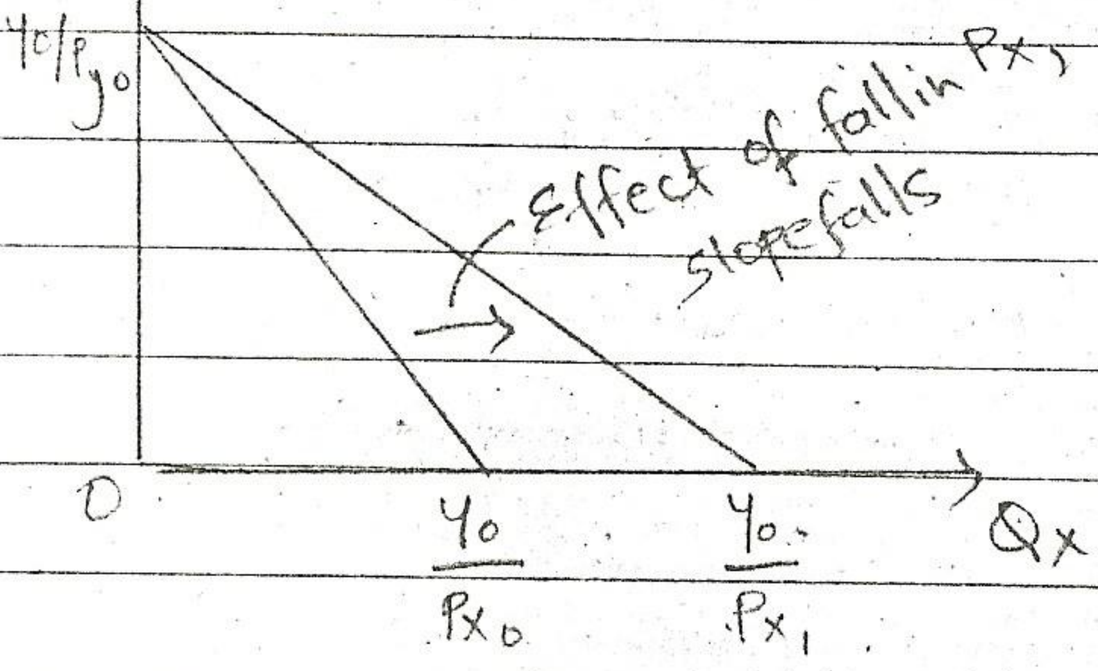
price of X per unit = $2

" " Y " " = $4



A budget line is also known as budget constraint or feasible region because it shows different combinations of X and Y that a consumer can buy with a given level of income. The slope of budget line is the ratio of prices of X and Y. In the example above the slope is 0.5 which applies that for every extra unit of X consumer buys he has to sacrifice half a unit of Y. In other words half a unit of Y is the opportunity cost of buying an extra unit of X. Any change in the level of income or prices of X and Y will alter the budget line. Following are some of the possible scenarios:

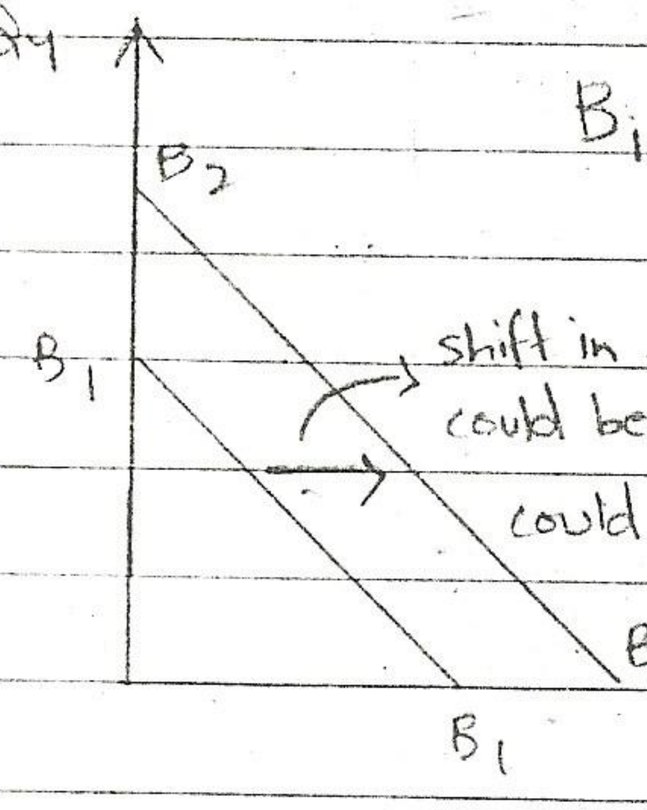
(a) Q_y ↑ — Y → income.



where $P_x < P_{x_0}$

(b) Q_y ↑

$B_1 // B_2$

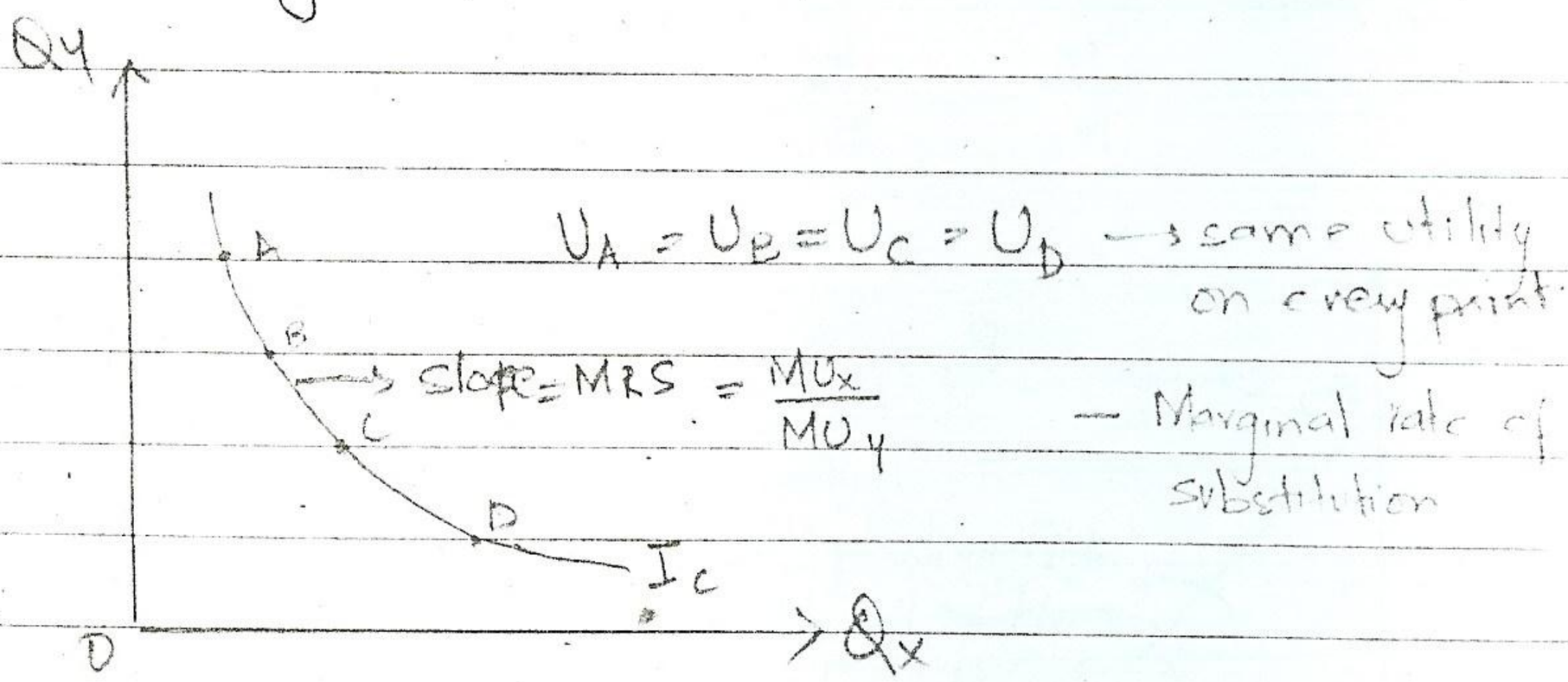


shift in budget line.

could be brought about by rise in "real income" which could be due to; (i) proportionate decrease in P_x & P_y
(ii) increase in the amount of "nominal income"

⇒ Indifference Curves.

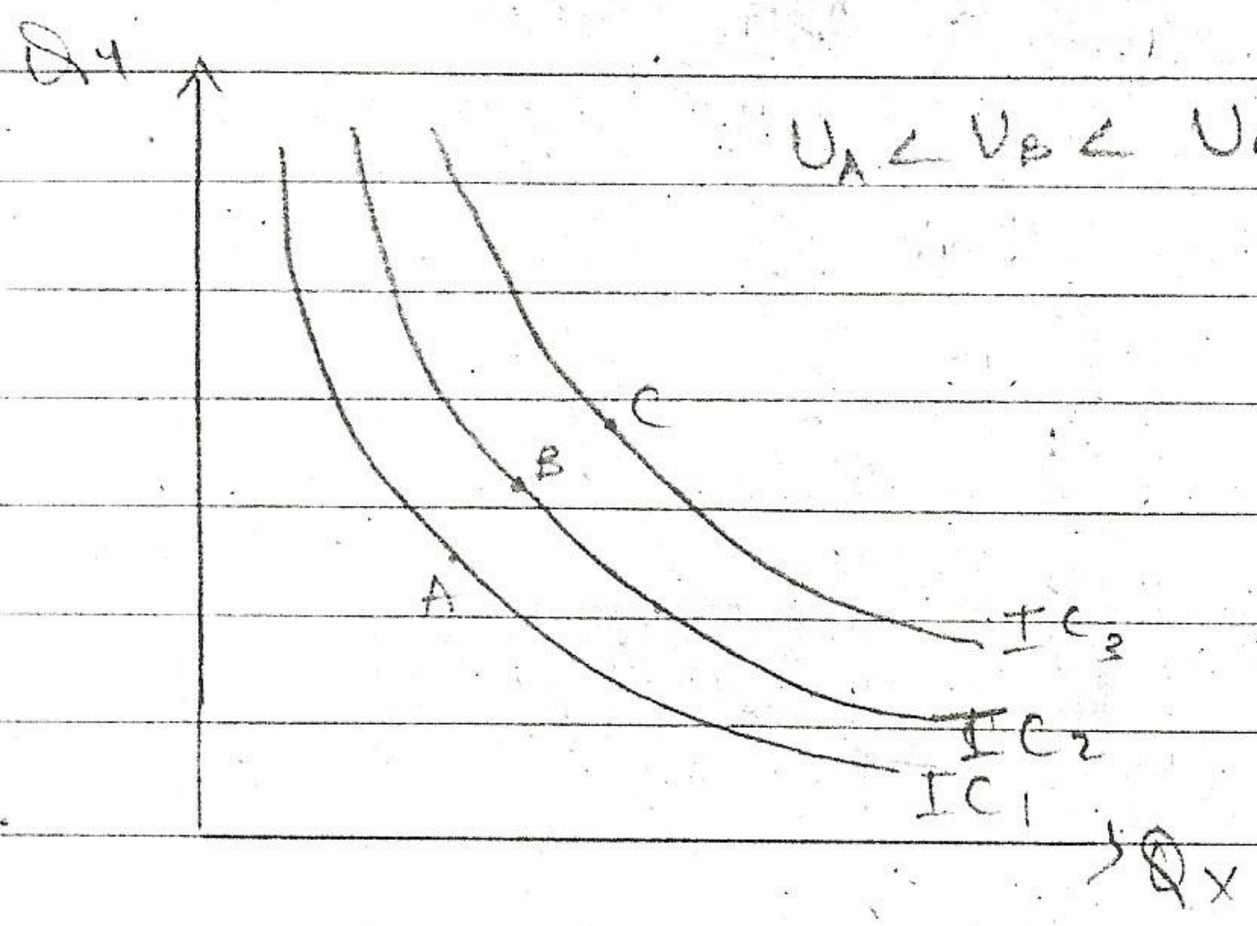
An indifference curve is a locus of all those points which show different combinations of X and Y yielding the same amount of utility / satisfaction to consumer. Indifference curves are always convex to the origin b/c the conform to the law of DMU

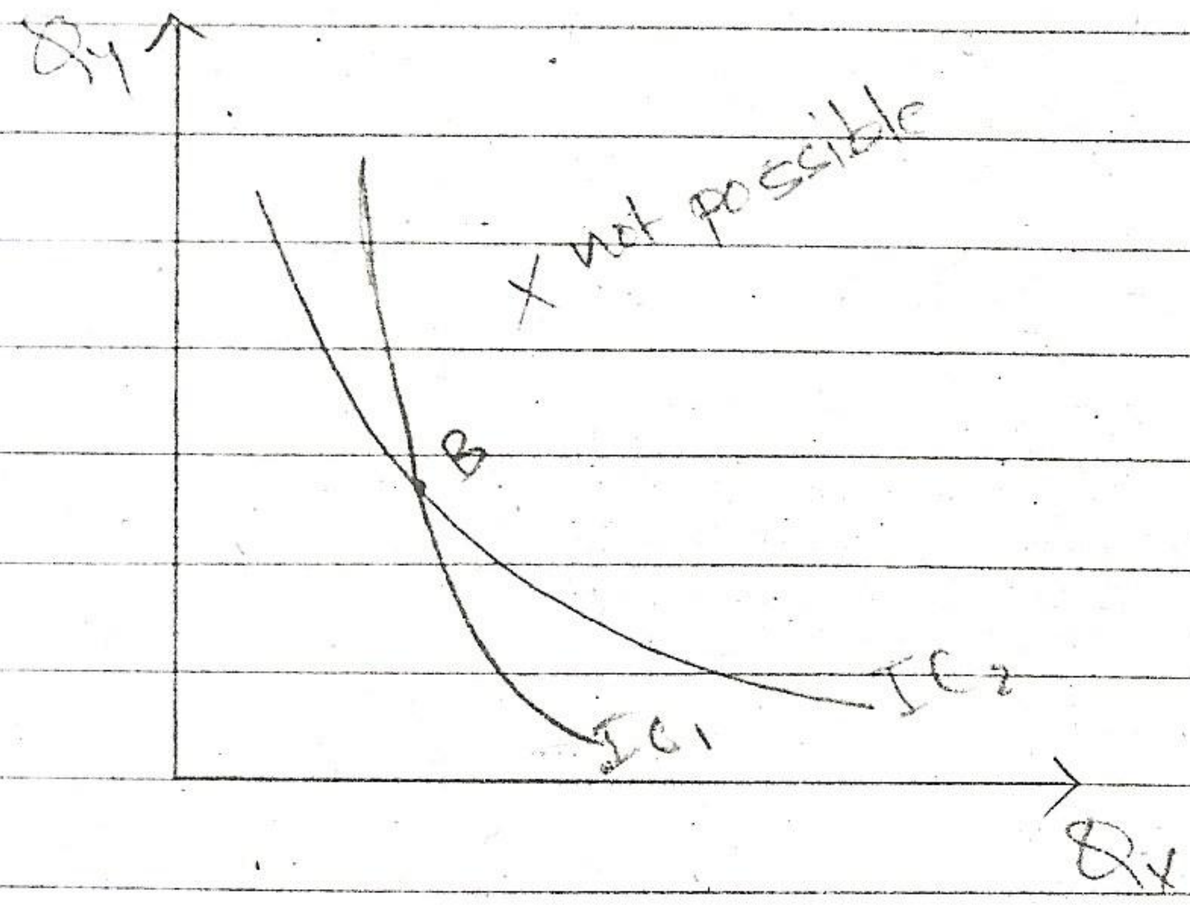


The slope of indifference curve is known as Marginal Rate of Substitution (MRS) and is expressed as $\frac{MU_x}{MU_y}$ which shows the quantity of Y that must be given up in order to offset the gain in utility derived from an extra unit of X. Convexity in an indifference curve shows that MRS decreases which is why it it is often referred to as diminishing marginal rate of substitution. In other words as we consume successive units of X the gain in TU declines, and therefore the amount of Y that must be given up in order to offset the gain in TU must also decline.

This is why convexity in indifference curve validates the law of DMU.

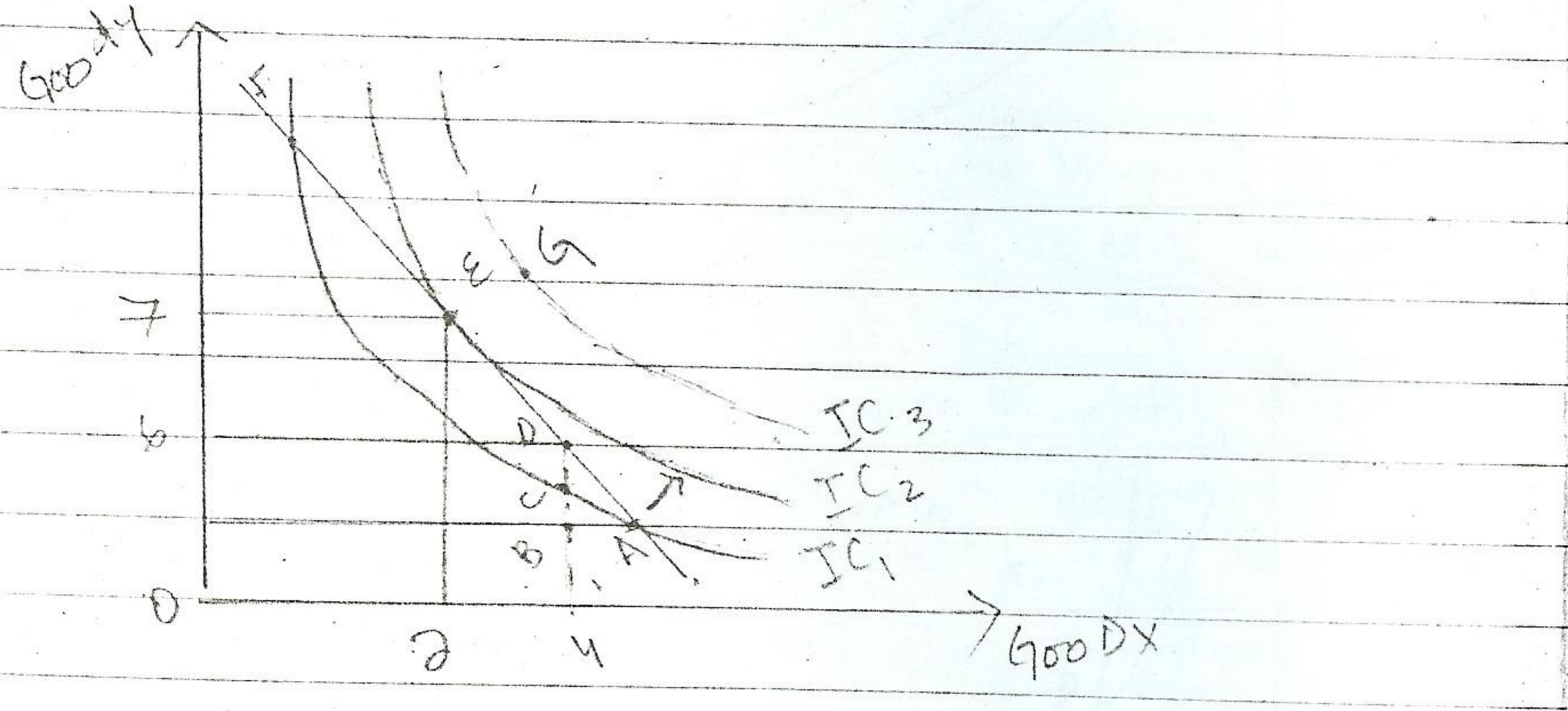
Indifference curves represent a certain rate of level of satisfaction and therefore as an individual moves to a higher indifference curve on a given indifference map (cluster of indifference curves) his utility/satisfaction increases. This also implies that two indifference curves can never intersect





⇒ ## Consumer Equilibrium.

Consumer equilibrium is achieved when its no longer possible for consumer to increase total utility / satisfaction by substituting good X for good Y and vice versa. In other words we can say that consumer is in equilibrium when marginal utility per $ spent of each good is equated $\left(\frac{MU_x}{P_x} = \frac{MU_y}{P_y}\right)$. This expression can also be rearranged as $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$. In other words we are saying that consumer equilibrium is achieved when the slope of indifference curve is equal to the slope of budget line.



$Y = \$32$

$P_X = \$2$ Per unit

$P_Y = \$4$ Per unit.

Units of X&Y	MU_X	MU_Y
1	9	28
2	8	26
3	7	24
4	6	22
5	5	20
6	4	18
7	3	16
8	2	14
9	1	12
10	0	10

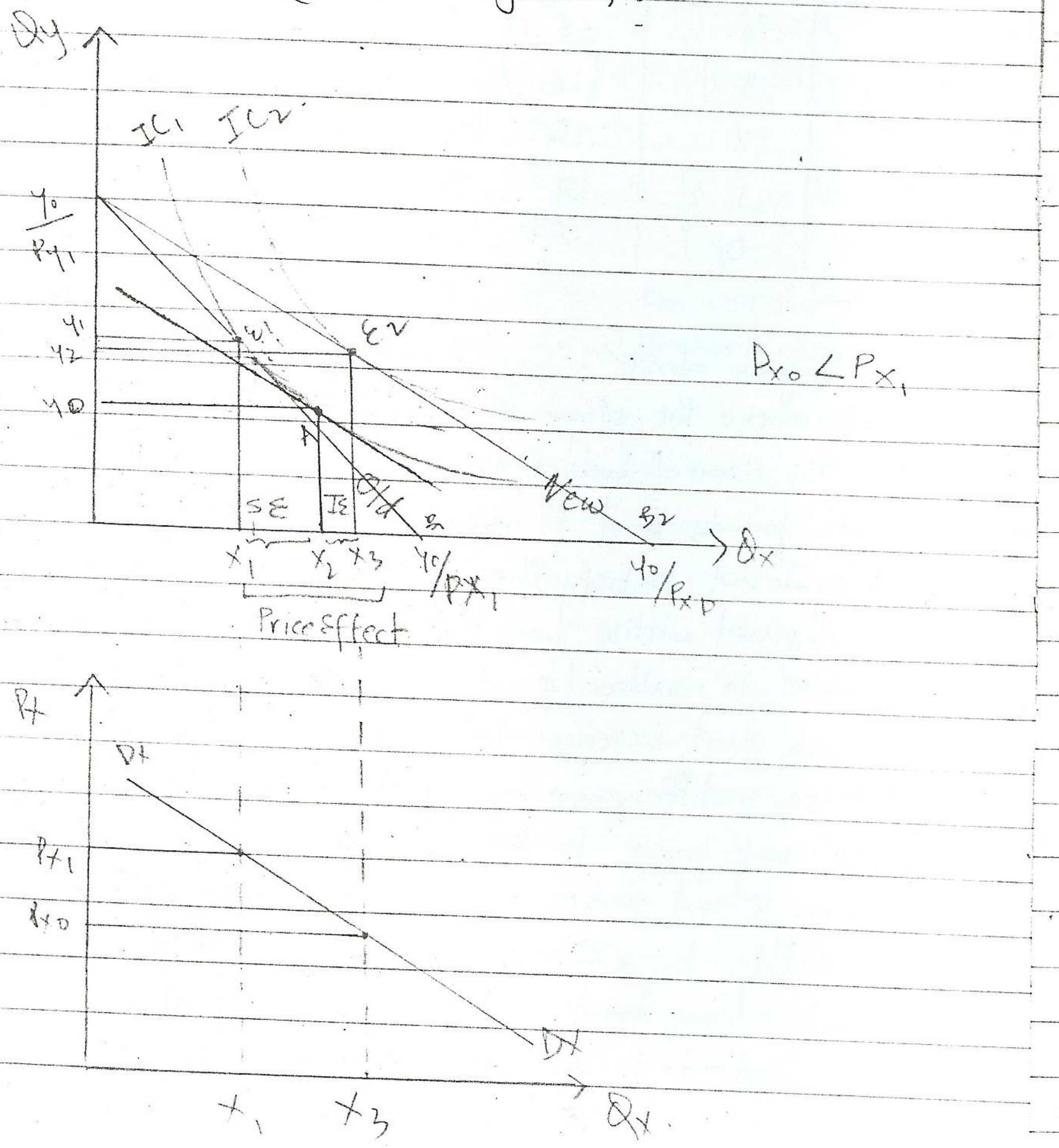
In the diagram above consumer equilibrium is achieved at point E where the slope of indifference curve $\left[\frac{MU_x}{MU_y} = \frac{P_x}{P_y}\right]$ equal to the slope of budget line.

Although points A & F also lie on the budget line but they do not satisfy the equilibrium condition because the margiual utility per $ spent is not equated and it is possible to reallocate expenditure from X to Y or viceversa and increase total utility by getting on a highee indifference curve such as IC2. In other words, any point to the right of E, individual is over-consuming X and under consuming Y so he can increase total utility by shifting expenditure from X to Y.

Similarly any point to the left of E such as point A i.e. the individual is over consuming Y and

underconsuming X and is possible to increase utility by shifting expenditure from Y to X..

Deriving Demand Curve for X
(X = normal good)



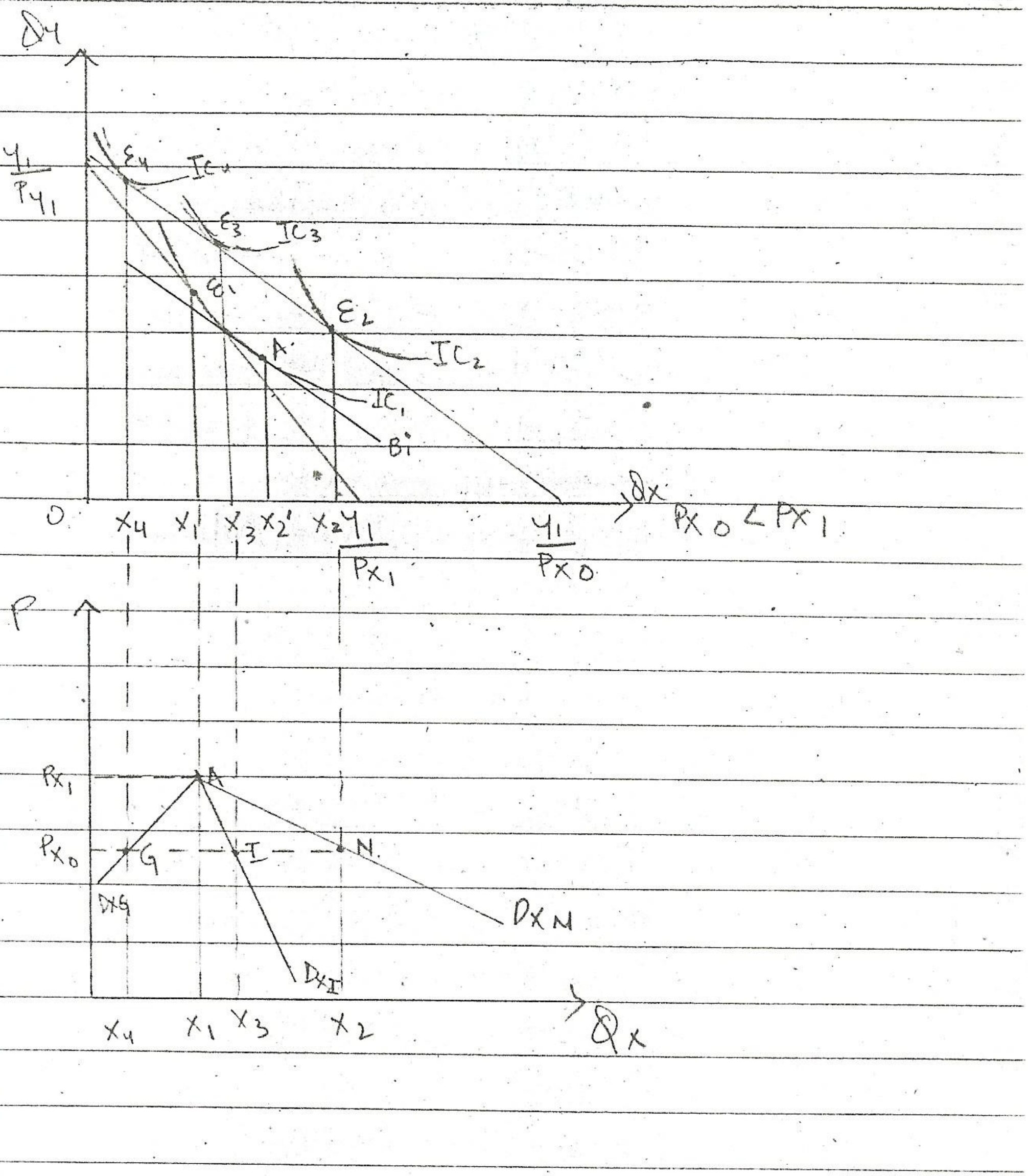
When price of a good falls the rise in Qd is known as price effect which can be decomposed into income effect and substitution effect. Fall in price of a good holding nominal income constant, increases purchasing power or real income of consumers and therefore the rise in Qd due to this reason is known as the income effect. At the sametime fall in price of a good makes it relatively cheaper to its substitutes and therefore some consumers will switch from substitute goods towards the good whose price has fallen. The rise in Qd due to this reason is known as substitution effect and by combining substitution effect ~~ina~~ and income effect we get price effect which determines elasticity of demand. In other words we are saying that price elasticity of demand is determined by magnitude of income & substitution effects.

In the diagram above, consumer is initially in equilibrium at point E_1 where quantity of X consumed is X_1, with price equal to Px_1 per unit. Now price of X falls to Px_0 and as a result budget line pivots to B_2. The equilibrium will now shift to E_2 where indifference curve IC_2 is tangent to B_2. The quantity of X corresponding E_2 is X_3, so we can say that X_1 to X_3 is the price effect which now will be decomposed into income effect

and substitution effect. To calculate the substitution effect we need to hold real income constant and see how consumption of X changes due to changes in relative prices. For this purpose we draw an imaginary budget line which is running parallel to B_2 and is tangent to the original Indifference Curve IC_1 at pt A. Since pt E, and A lie on the same Indifference Curve, it follows that utility / ~~sat~~ real income is constant and therefore the ~~cha~~ change in consumption of X from X_1 to X_2 (X_2 corresponds to point A) is attributed to substitution effect and therefore the remainder from X_2 to X_3 becomes income effect (consumer moves to a higher indifference curve from IC_1 to IC_2 which implies a rise in real income.)

Normal / Inferior and Griffin goods.

Normal, Inferior & Giffin Goods.



As mentioned before substitution effect is always consistent with the law of demand regardless of the nature of good. So if we are looking at the case of fall in price of X, substitution effect should always show increase in Qd due to change in relative prices holding real income constant. This implies that its the income effect which determines classification of good as normal, inferior and Giffin. In the diagram above original equilibrium is at E_1 where x_1 of x is consumed at price P_x, per unit. Fall in price to P_{x_0} increase Qd from x_1 to x_2' through substitution effect which is shown by a movement from point E_1 to A along IC_1. For income effect there are three possible scenarios which are as follows:

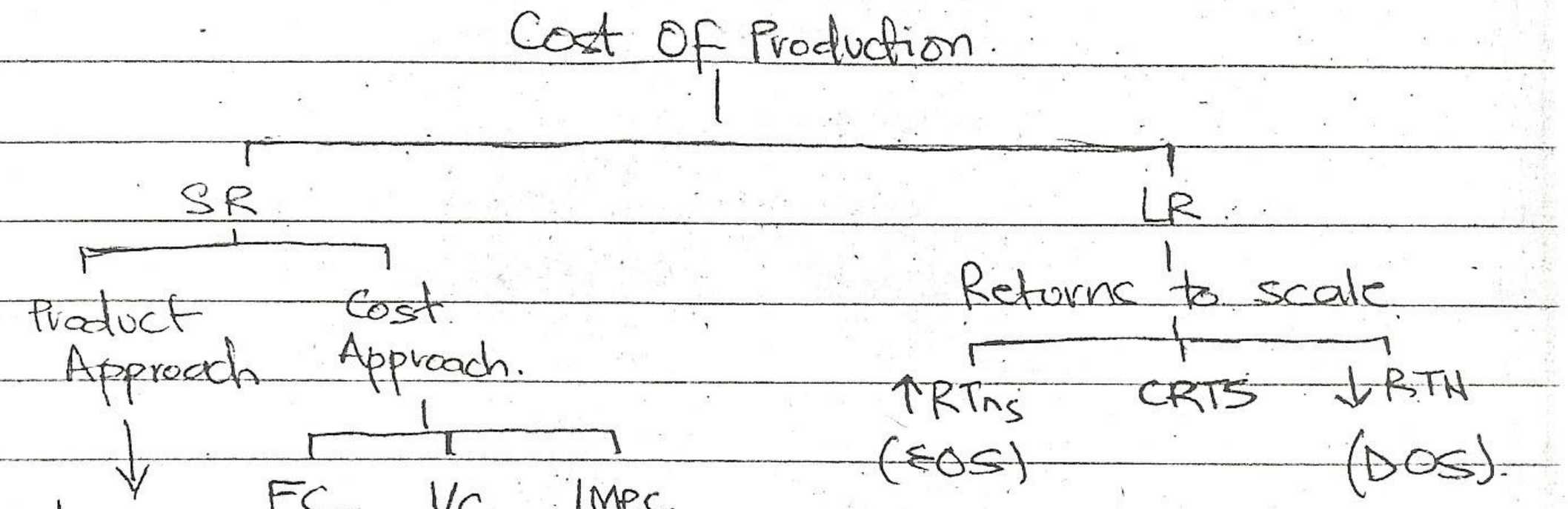
→ If X is normal then income effect should reinforce substitution effect and the quantity of X consumed must lie to the right of X_2'. In this case individual will move from IC_1 to IC_2 and will be in equilibrium at point E_2 consuming X_2 of X. These two combinations of price & and quantity i.e P_{x_1}, X_1 and P_{x_0}, X_2 give us points A and N which can be connected to derive demand curve for a normal good (DX_N). The fact that substitution effect & Income effect move

in the same direction not only increases the magnitude of PE but also PED which is why DX_N is relatively flatter.

⟹ If x is taken as an inferior good then income effect should be negative i.e rise in "real income" due to decrease in Px should actually reduce the Qd of X. However, by definition negative income effect of an inferior good only partially offsets the substitution effect which implies that demand curve remains downward sloping but is relatively steeper. In the diagram above income effect of an inferior good will take individual from pt A on IC_1 to point E_3 on IC_3 corresponding to X_3. In the lower panel when we coordinate X_3 with P_{X_0} we get point I which connected to point A will give us demand curve of an inferior good DX_I. It is obvious that counteraction of substitution effect reduces the magnitude of PE and consequently ~~price~~ PED.

⟹ If X is a giffin good then income effect will more than offset the substitution effect resulting in an ~~an~~ upward sloping demand curve. Giffin goods are a special type of inferior goods because rise in real income (due to change in price not nominal income) will lead to decrease in their consumption. Giffin goods create a ~~snob~~ Snob appeal and ppl buy them b/c they have a niche market

and their consumption reflects a certain social status. For example for a large drop in price diamonds could become giffin b/c most ppl can afford to buy them. In the diagram above ~~the~~ income effect will take consumer from point A on IC_1 to Point E_4 on IC_4 which corresponds to X_4. This quantity is coordinated with Price P_{X_0} gives us point G which can be connected to point A to derive demand curve. ~~D_{X_0}~~ D_XG.



Short Run Vs Long Run:

Short run is defined as a time frame where producer can alter his level of output by changing the quantity of variable factors of production holding atleast one factor constant. So if we say that production is a function of capital and labour [Q = f(K,L)] we will hold capital constant in the short run and alter production by changing the quantity of ~~variable factors~~ labour.
In contrast, long run refers to a time frame where no factor of production is fixed. The relationship b/w input and output in the long run is explained by Returns to Scale while in the short run it is explained by the law of variable proportions.

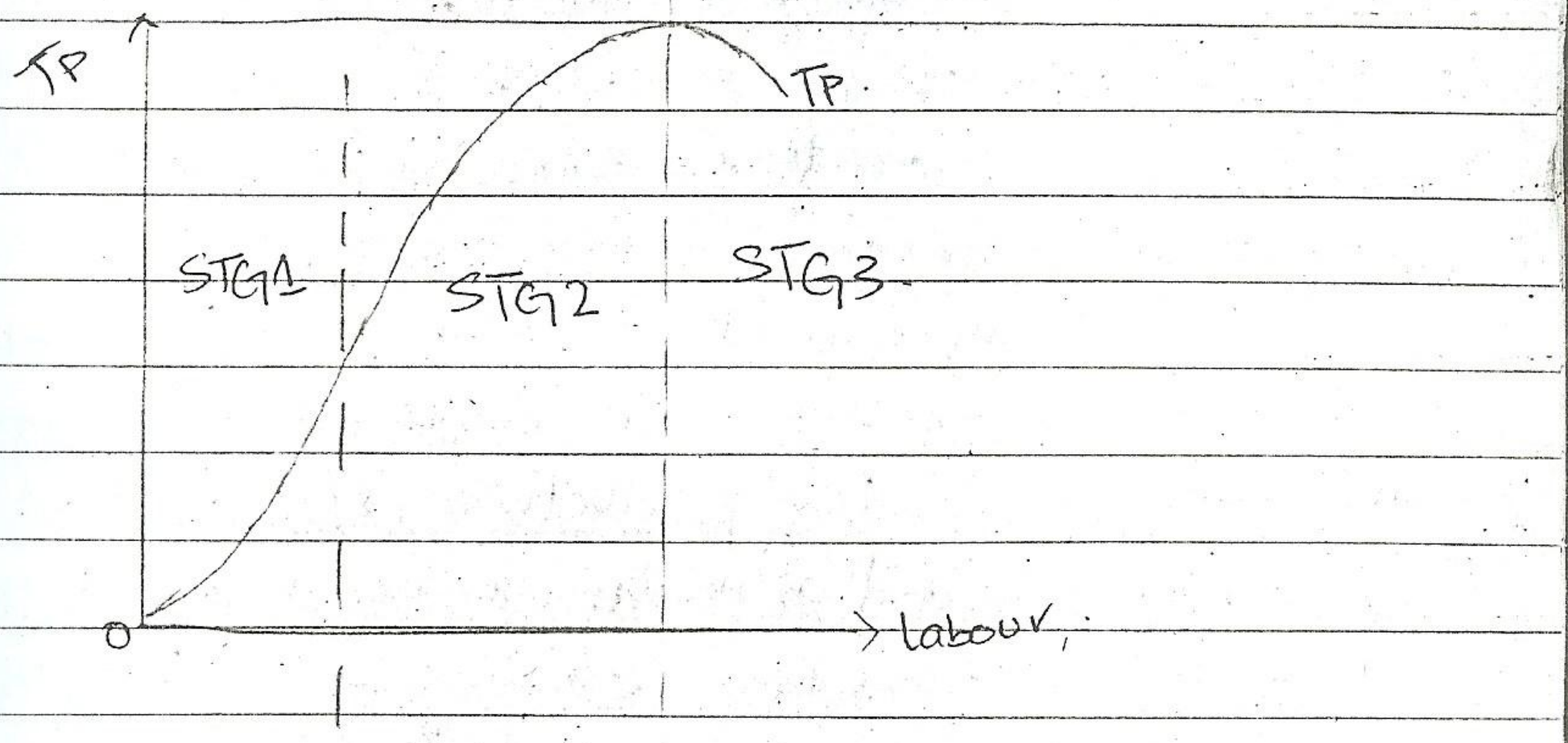
Law of Variable Proportions

. The law of variable proportions is a short run phenomenon. According to the law as we employ successive units of a variable input holding atleast one factor constant, the total output will initially increase at an increasing rate, then at a decreasing and after reaching its maximum, will eventually decline.

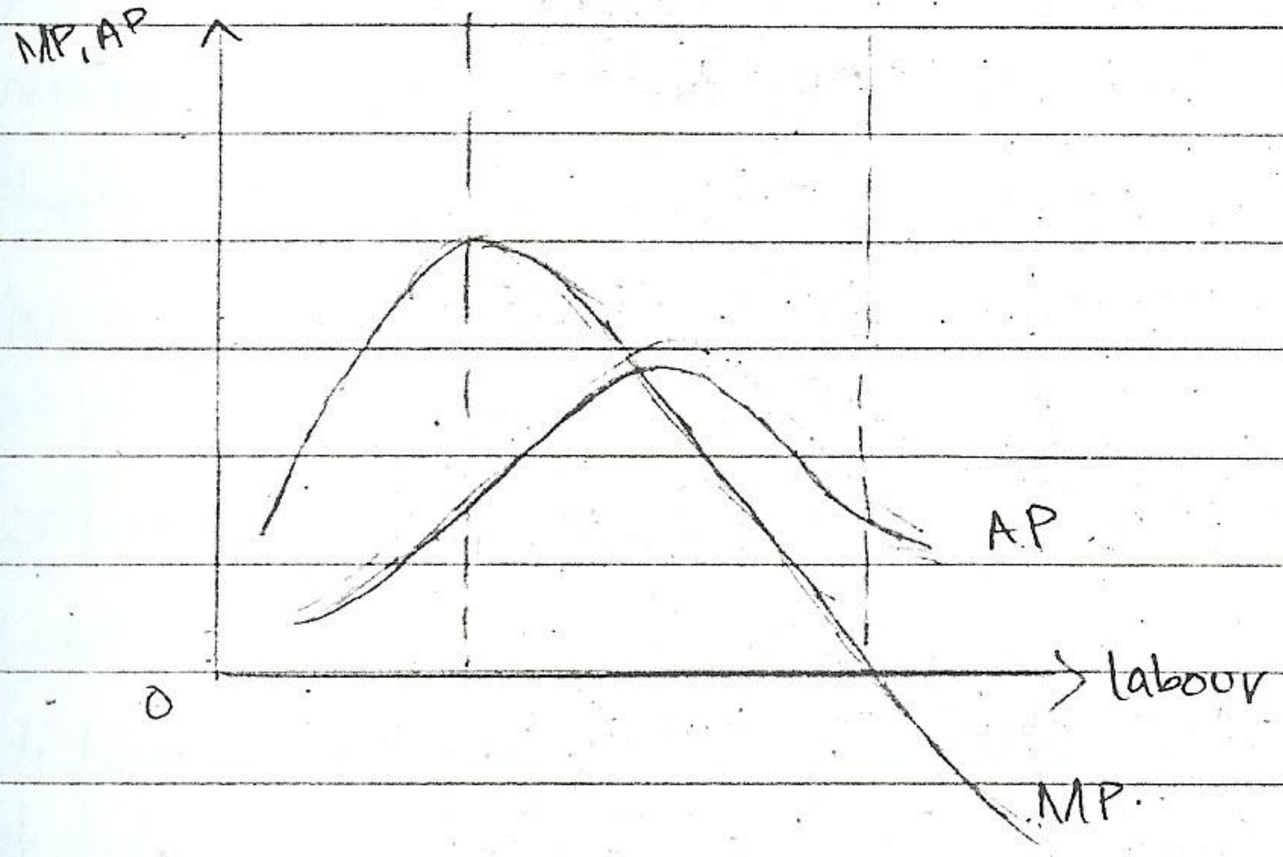
$AP = \frac{TP}{L}$ $MP = \frac{\Delta TP}{\Delta L}$

Qof k	Q of lab	TP or output	AP	MP
5	0	0	0	X.
5	1	8	8	8
5	2	20	10	12
5	3	36	12	16
5	4	50	12.5	14
5	5	60	12	10
5	6	68	11.33	8
5	7	70	10	2
5	8	66	8.25	(4)

(A)



(B)



In Panel A there are increasing marginal returns in stage 1, as every successive units of labour employed adds more to output than the preceeding unit. This is why marginal product corresponding to stage 1 is upward sloping. In stage 2 the capital to labour ratio is less than optimum which is why diminishing returns have set in, i.e, every successive unit employed in this stage is adding less to total output than the preceeding unit. This is why marginal product corresponding to stage 2 is downward sloping. This stage is

known as the diminishing marginal return and since its the most predominant stage in law of variable proportions, the law itself is sometimes referred to as the law of diminishing returns.

After reaching maximum in stage 2, total product in stage 3 starts to decline, suggesting that employment of more labour/ variable factor is counter productive, b/c instead of increasing output it will actually decrease it. This is why marginal product curve corresponding to stage 3 is negative after cutting the 'x' axis where total product is maximum. This stage is known as Negative marginal returns and rational entrepreneur will eventaker production into this stage as it is tantamount to loss maximisation.

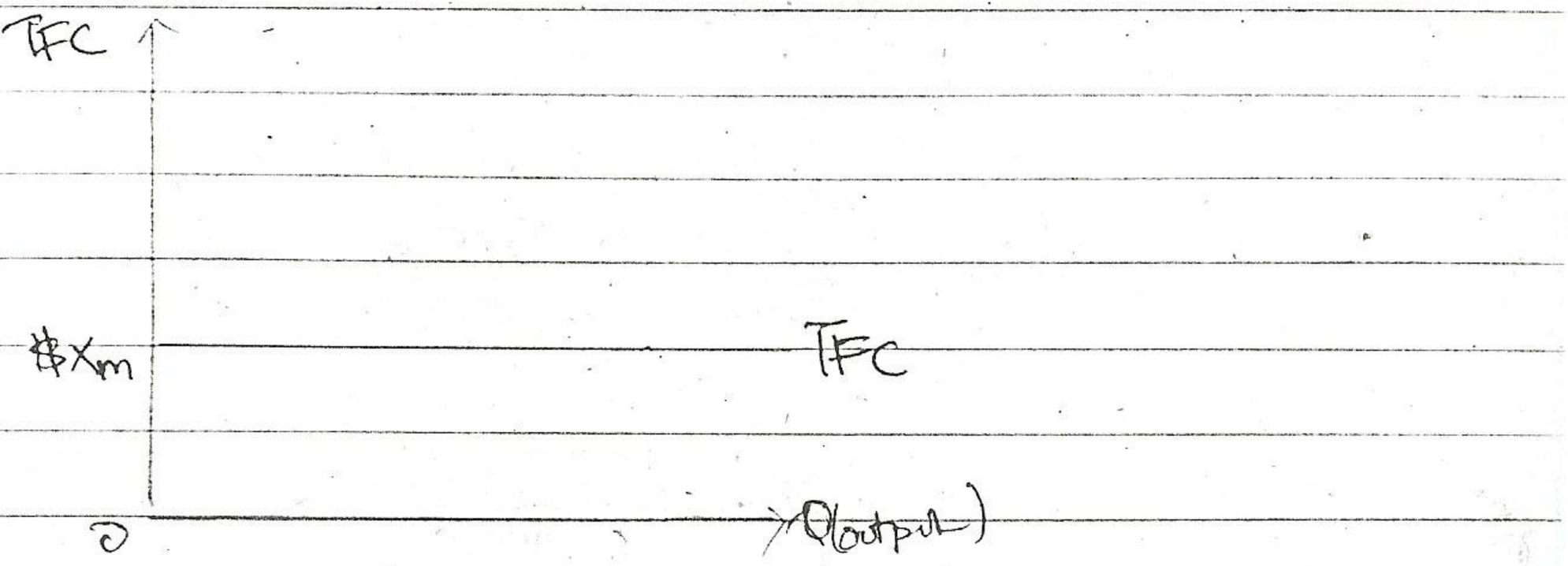
⇒ Relationship b/w Marginal Product & Average Product

Marginal Product is the slope of total product and it determines the behaviour of Average Product. When ~~tot~~ total Product is increasing at an increasing rate, marginal product is increasing and it causes average product to also increase. On the other hand when total product is increasing at a decreasing rate MP starts to decline. and it will eventually pull ~~av~~ AP also downwards. This relationship b/w MP and AP suggests "When MP is rising, AP also rises but MP > AP (MP looks at the rate of change whereas AP incorporates every change into the existing base and calculates a new average), therefore

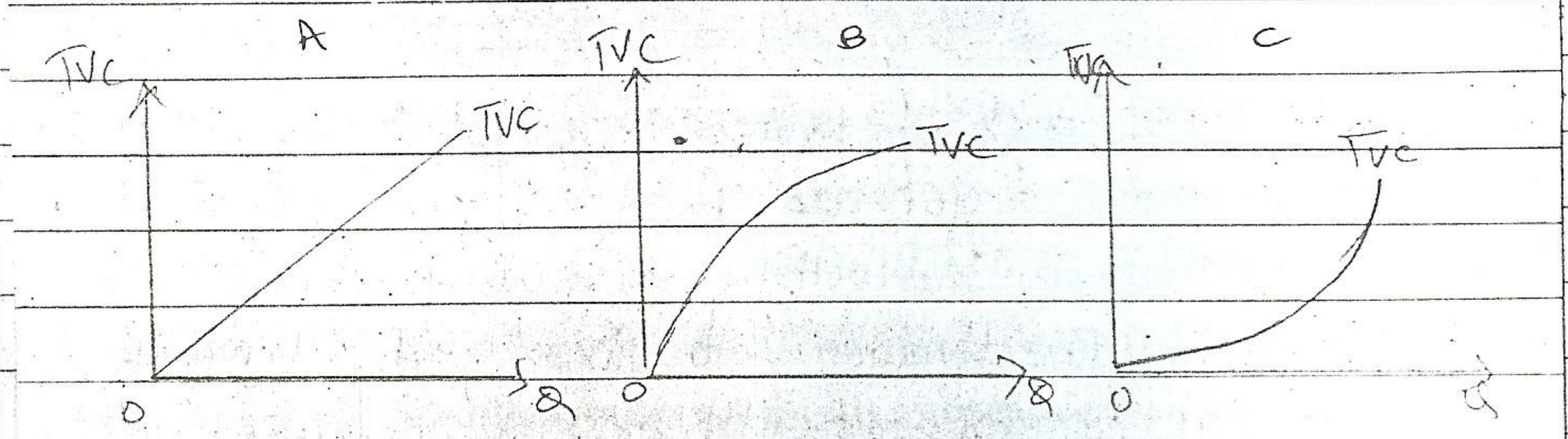
AP will always move sluggishly relative to MP.) Similarly when MP is falling, AP will also fall but the rate of fall in MP will be more, therefore MP < AP. This implies that MP will cut AP at its maximum (approximately)."

⇒ Cost Approach :

Under the cost approach we focus on the total amount of money spent on acquiring factors of production rather than looking at the productivity of each factor. Cost of production can be divided into fixed cost, Variable and implicit cost (opportunity cost of resources employed in a business). Fixed cost refers to cost that is incurred at zero level of output but it will remain at that level in the shortrun regardless of the scale of production. Cost of acquiring plant assets, furnitures & fixtures, insurance, advance rentals & leasse agreements are all classified as fixed cost. Total fixed costs function will run parallel to quantity axis suggesting that it is independent of output in shortrun.



Variable cost is defined as "cost which varies directly with the level of output." Examples of VC include raw material cost, direct labour, transportation and distribution, heating & lighting etc. The rate at which VC varies with output can be different:



In panel A total variable cost increases at a constant rate, while in panel B TVC increases at a decreasing rate and in panel C TVC increases at an increasing rate. MC of Production is defined as $\frac{\Delta TC}{\Delta Q}$.

Since TC equals $\overline{FC} + VC$, it follows that $MC = \frac{\Delta VC}{\Delta Q}$.

So in panel B MC is decreasing which is another way of saying increasing marginal returns b/c ~~fed~~ decreasing marginal cost is a mirror image of increasing MP. Conversely, panel C shows rising MC ~~and~~ which is another way of saying diminishing returns as it becomes a mirror image of declining MP.