{ Chapter # 02 }

Budget Constraint

The economic theory of consumer is very simple: economists assume that consumers choose the best bundle of goods they can afford. To give content to this theory, we have to describe more precisely what we mean by "best" and what we mean by "can afford".

In this chapter we will read about what consumers can afford.

→ The Budget Constraint:
We begin by examining the concept of the budget constraint. Suppose that there is some set of goods from which the consumers can choose. We will indicate the consumers consumption bundle by (x_1, x_2). This is simply a list of two numbers that tells us how much the consumer

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is choosing to consume of good 1, x_1 and good 2, x_2. Sometimes its convenient to denote the consumers bundle (x_1, x_2) by a single symbol like X.

We suppose that we can observe the prices of two goods (P_1, P_2) and the amount of money the consumer has to spend, m. Then the budget constraint of a consumer can be written as

$$P_1x_1 + P_2x_2 \leq m$$

P_1x_1 = mony spending on good 1.
P_2x_2 = money spending on good 2.

The budget constraint of consumers requires that the amount of money spend on two goods be no more then the total amount the consumer has to spend. Simply means that the spending on goods should not exceed money m.

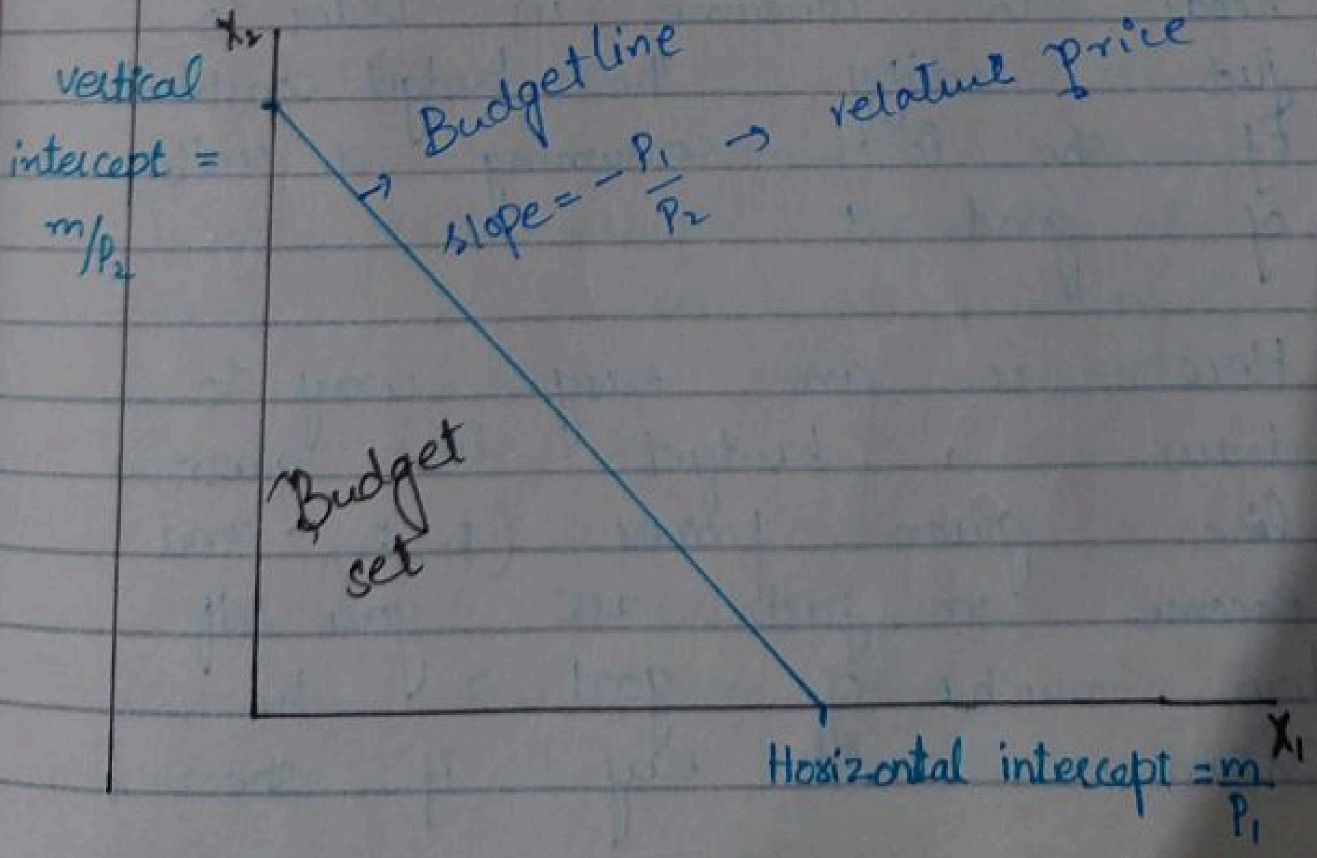
The consumer's affordable consumption bundle are those that don't cost any more than m.

We call this set of affordable consumption bundle at prices (P_1, P_2) and income m the Budget set of the consumer.

⊛⇒ Properties of the Budget set:

The budget line is the set of bundles that cost exactly m:

$$P_1 x_1 + P_2 x_2 = m$$



Budget set :

The budget set consists of all bundles that are affordable at a given prices and income.

We can rearrange the budget line in equation to give us the formula

$$x_2 = \frac{m}{P_2} - \frac{P_1}{P_2} x_1 \longrightarrow (i)$$

This is the formula for the straight line with the vertical intercept of m/P_2 and the slope of $-P_1/P_2$. The formula tells us how many units of good 2 the consumer needs to consume in order to just satisfy the budget constraint if she is consuming x_1 units of good 1.

Here is an easy way to draw a budget line given line given prices (P_1, P_2) and income m. Just ask your self how much of good 2 the consumer could buy if she spent all of her money on good 2. The answer is, of course, m/p_2, and some case of good 1, The answer is m/p_1.

Thus the horizontal and vertical intercepts measures how much the consumer could get if she spent all of her income on good 1 and 2, respectively.

In order to show the budget line just plot these two points on the appropriate ~~axes~~ axes of the graph and connect them with a straight line.

* → The slope of the budget line has a nice economic interpretation. It measures the rate at which the market is willing to "substitute" good 1 for good 2.

Suppose for example: That the consumer is ~~goo~~ going to increase her consumption of good 1 by Δx_1. So how much will her consumption of good 2 have to change in order to satisfy her budget constraint?

Let us use Δx_2 to indicate her change in the consumption of good 2.

Now note that if she satisfy her budget constraint before and after making the change she must satisfy.

$$p_1 x_1 + p_2 x_2 = m \rightarrow (i).$$

and

$$p_1(x_1 + \Delta x_1) + p_2(x_2 + \Delta x_2) = m \rightarrow (ii)$$

Subtracting the equation (i) from (ii)

$$p_1 \Delta x_1 + p_2 \Delta x_2 = 0$$

This says that the total value of change in her consumption must be zero. Solving for $\Delta x_2 / \Delta x_1$, the rate at which good 2 can be substituted for good 1 while still satisfying the budget constraint, gives

$$\frac{\Delta x_2}{\Delta x_1} = -\frac{p_1}{p_2}$$

This is just the slope of the budget line. The -ive sign is there since Δx_1 and Δx_2 must always have opposite signs. If you consume more of good 1, you have to consume less of good 2 and vice versa if you continue to satisfy the budget constraint.

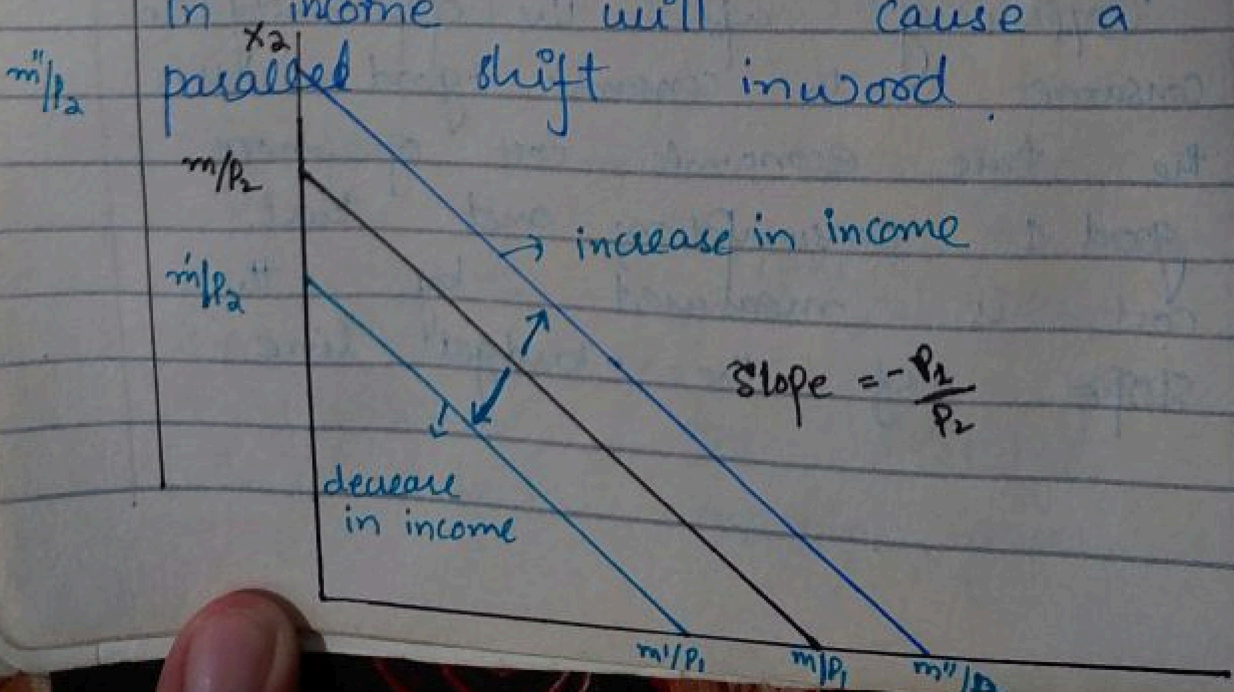
⇒ Economists sometimes say that the slope of the budget line measures the opportunity cost of consuming good 1. In order to consume more of good 1 you have to give up some consumption of good 2. Giving up the opportunity to consume good 2 is the true economic cost of more good 1 consumption; and that cost is measured by the slope of the budget line.

⇒ How the budget line Changes :-

When prices and incomes change, the set of goods that a consumer can afford changes as well. How do these changes affect the budget set?

⇒ i) Price and incomes Change

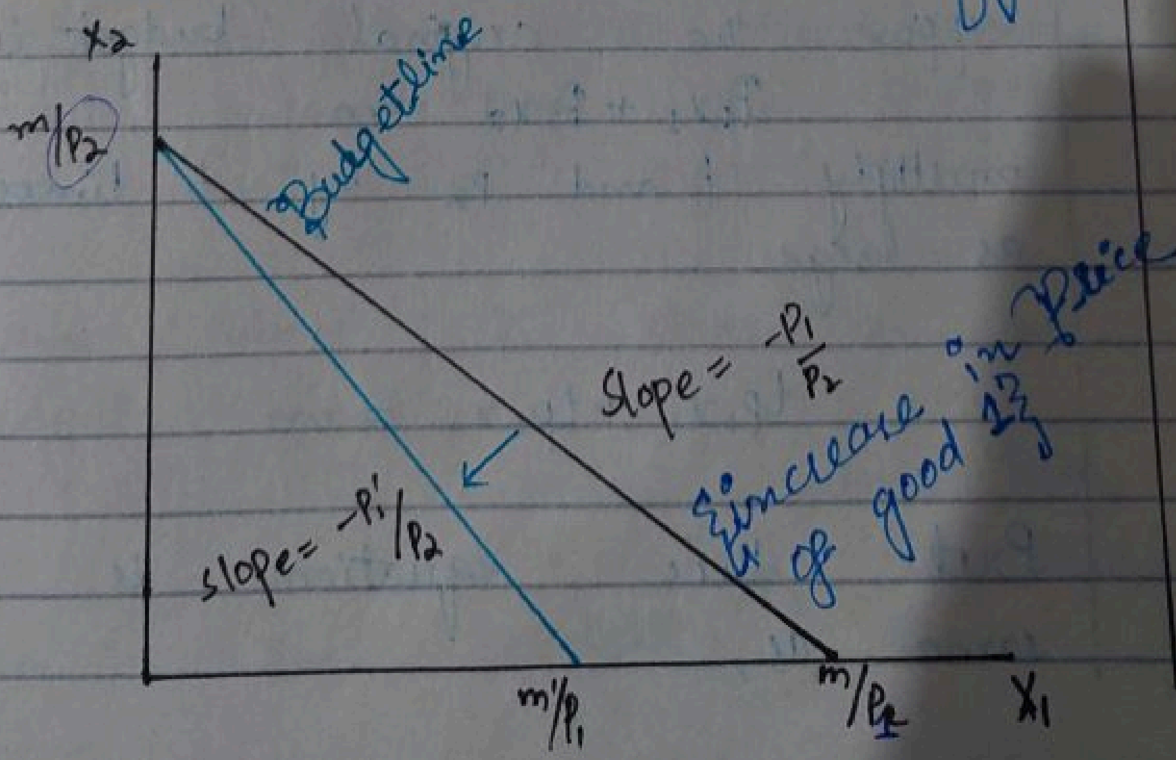
* Income :-
Let us consider changes in income.
An increase in incomes will increase the affordibality of consumers, Thus an increase in incomes will result in parallel shift outwood of the budget line, Similarly, a decrease in in income will cause a parallel shift inwood.



So, increase in Income will shift budget line upword and decrease in incomes will shift budget line Inword and the slope of the line will not be affected.

* What about the changes in Price?

Let us Consider increasing price 1 while holding price 2 and income fixed.
So increasing P_1 will not change the vertical intercept, but it will make the budget line steeper since P_1/P_2 will become larger, and the horizontal intercept of the budget line must shift inword as shown in figure.



So, If good 1 becomes more expensive, the budget line becomes ~~st~~ steeper

* What happens to the budget line when we Change the prices of good 1 and good 2 at the same time?

Suppose when we double prices of both good 1 and 2. In this case both horizontal and vertical intercepts shift inword by a factor of one-half, and therefor the budget line shifts inword by one-half as well.
Multipling both sides/Prices by two is just like dividing Income by 2.

Suppose the original budget is

$$p_1x_1 + p_2x_2 = m$$

multiply p_1 and p_2 by t times as large.

$$tp_1x_1 + tp_2x_2 = m$$

But this equation is same as,

$$p_1 x_1 + p_2 x_2 = \frac{m}{t}$$

Thus multiplying both prices by a constant amount t is just like dividing income by the same constant t.

It follows that if we multiply both prices by t and we ~~divide income income by~~ multiply income by t, then the budget line will not change at all.

⇒ What happens when price and income changes together?

What happens when price goes up and income goes down?

If m decreases and p_1 and p_2 increases then the intercepts m/p_1 and m/p_2 both must decrease this means that the budget line will shift inword.

(*) What about the slope of the budget line?

if p_2 increases more then p_1, so that $-p_1/p_2$ decreases then the budget line will be flatter and similarly if P_2 increases ~~Similar~~ less then P_1, then the budget line will be steeper.

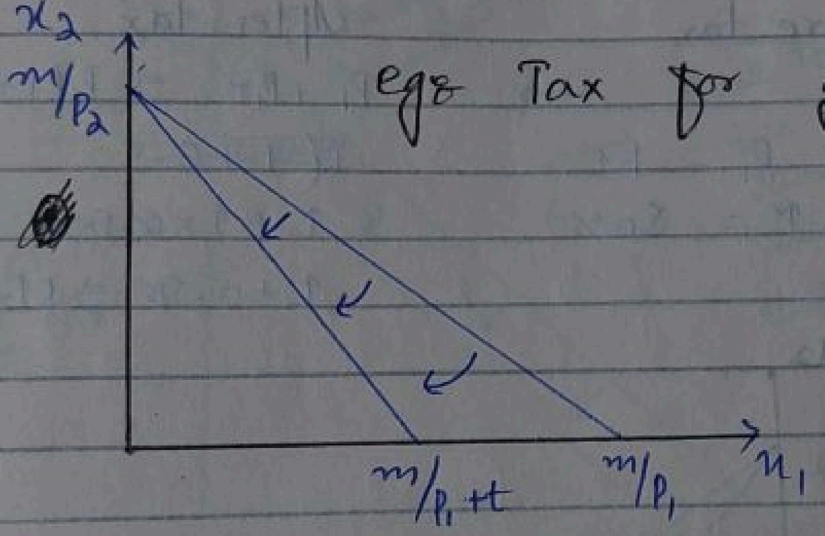
⇒ Taxes, Subsidies, and Rationing.

Economic policy often uses tools that affect a consumer's budget constraint such as taxes. For example if a government imposes a Quantity tax, this means that the consumer has to pay a certain amount to the government for each unit of the good he purchases.

How does a quantity tax affect the budget line of a consumer. According to consumer the tax is just a higher price, thus a quantity tax of t dollars per unit of good 1 simply changes the price of good 1 from P_1 to P_1+t and thus the budget line must get steeper.

Before tax P_1 After tax P_1+t

ex : $P_1 = \$1 \rightarrow P_1+t = 1+0.50 =$
$t = 0.50$/unit $= 1.50$



eg: Tax for gas.

→ Value tax :

A value tax is a tax on the value - the price of a good, rather then the quantity purchased of a good, usually expressed in percentage terms.

(*) If good 1 has a price P_1 but is subject to a sales tax at rate τ, then the actual price the consumer is facing

$p_1 + p_1\tau \Rightarrow p_1(1+\tau)$.

Examples: If a product costs \$100 and there is a 15% value added tax, the consumer pays \$115 to the merchant.

Before tax → After tax.

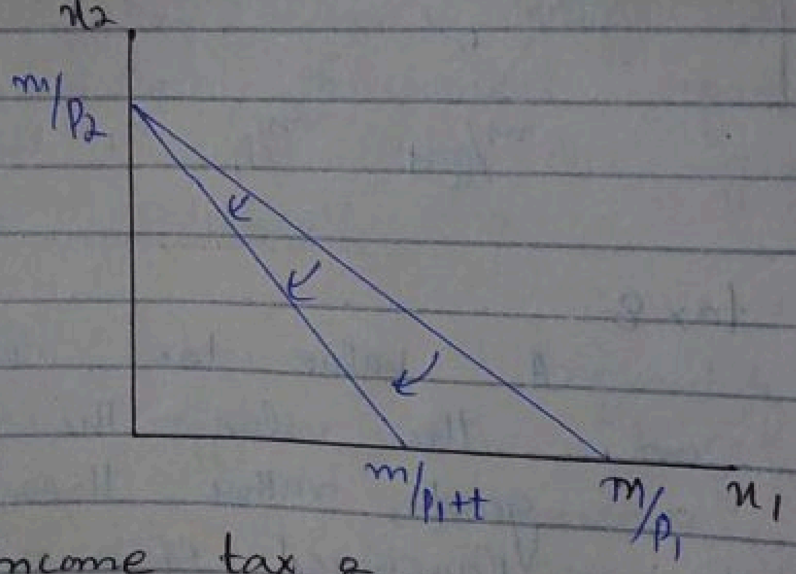
$p_1 \longrightarrow p_1 + p_1\tau \Rightarrow p_1(1+\tau)$

~~1(1 + 0.5~~

ex: $p_1 = \$1$, $\tau = 50\%$

$1 + 1 \times 50\%$

$1 + 0.50 \Rightarrow \$1.50$



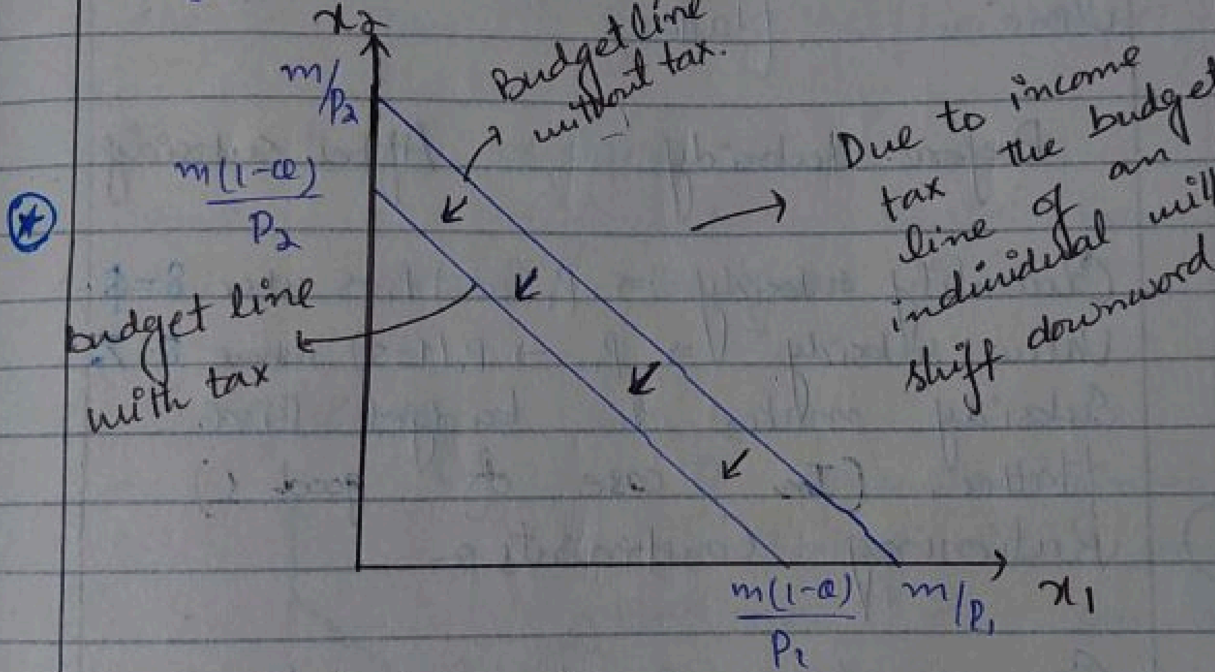
→ Income tax:

Lets α is the %age of income to be paid as a tax so

Before tax → After tax.

$m \rightarrow m - m\alpha \Rightarrow m(1-\alpha)$

As we know that there is no change in P_1 or P_2 and there is not any tax on any of the prices and here it is a tax on individuals income, so the budget line will shift downword.



② Subsidy:

A subsidy is the opposite of tax.

→ **Quantity subsidy:**

In case of the quantity subsidy, the government gives an amount to the consumer that depends on the amount of the good Purchased.

If the subsidy is s dollars per unit of consumption of good 1, then from the viewpoint of the consumer, the price of good 1 would be $P_1 - s$. This would therefore make the budget line flatter.

Before Subsidy After subsidy

Quantity subsidy $\Rightarrow P_1 \rightarrow P_1 - s$ where $s = \$$
Value subsidy $\Rightarrow P_1 \rightarrow P_1(1-s)$ where $s = \%$
Subsidy makes the budget line flatter (In case of good 1)

(3) Rationing Constraints :

Governments sometimes impose rationing constraints. This means that the level of consumption of good 1 is fixed to be no longer then some amount. Suppose, for example, that good 1 were rationed so that no more than x_1 could be consumed by a given consumer.

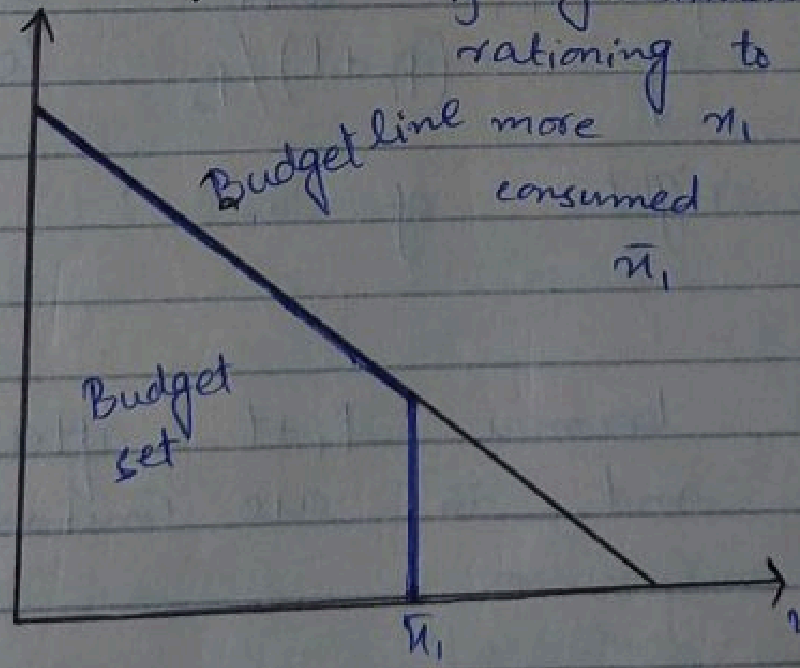
The lopped-off piece consists of all the consumption bundles that are afford-able but have $x_1 > \bar{x}_1$

for example: The government says that a person cannot buy more then one gun for his/her safety.

So, the budget line will have a different shape then the original budget line.

Graphically:

If government imposes rationing to $\bar{x}_1$: No more x_1 can be consumed after $\bar{x}_1$



If good 1 is rationed, the section of the budget set beyound the rationed quantity will be lopped off.

Sometimes taxes, subsidies and rationing are combined:

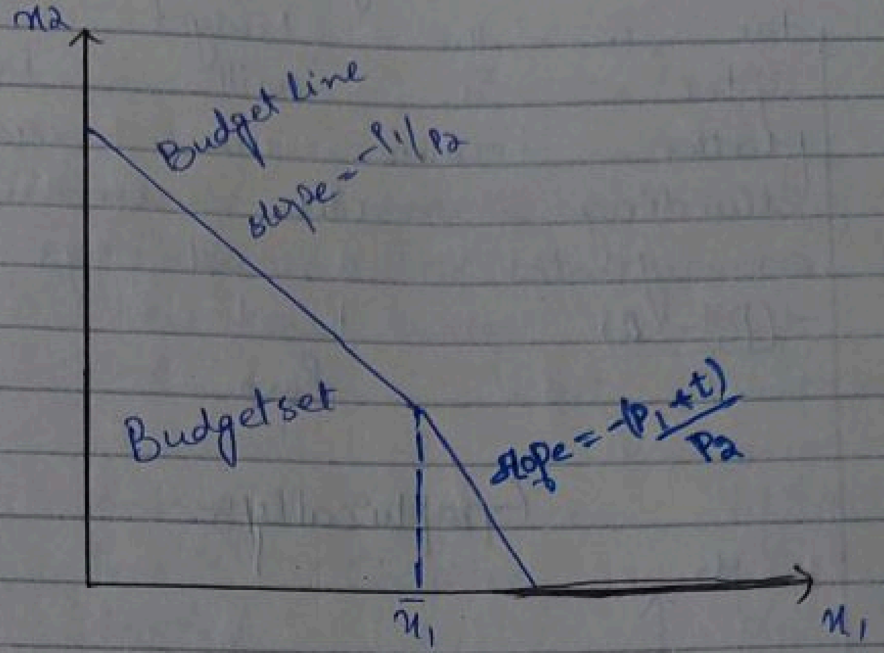
We could consider a situation where a consumer could consume good 1 at a price of P_1 upto some level $\bar{x}_1$, and then had to pay a tax t on all consumption in excess of $\bar{x}_1$

Here the budget line has slope of $-P_1/P_2$ to the left of $\bar{x}_1$, and a slope of $-(P_1+t)/P_2$ to the right of $\bar{x}_1$

- P_1 becomes P_1+t after $\bar{x}_1$
  $\bar{P}_2$ and $\bar{m}$ are constant.

Graphically:

⊛



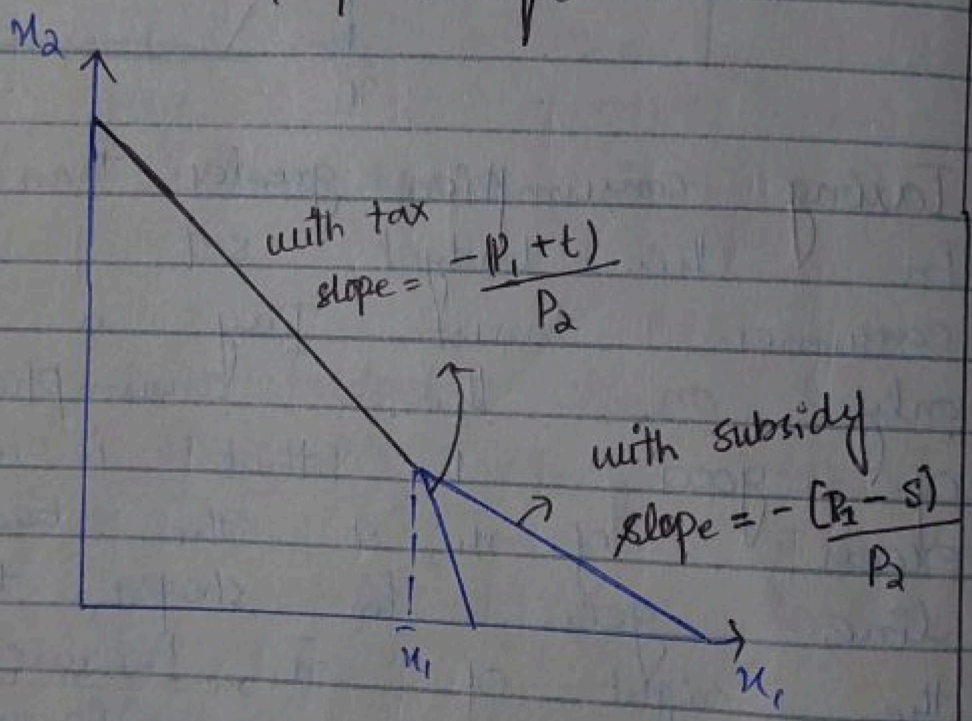
→ Taxing consumption greater than $\bar{x}_1$.
In this budget set the consumer must pay a tax only on the consumption of good 1 that is in excess of $\bar{x}_1$, so the budget line gets ~~to~~ steeper to the right of $\bar{x}_1$, because I am dividing a larger number on smaller number
e.g: $-\frac{(p_1+t)}{p_2}$ ⇒ $\frac{\text{Rise}\uparrow}{\text{Run}}$

→ Subsidizing Consumption greater then $\bar{x}_1$

If there is a subsidy after $\bar{x}_1$ instead of tax, so the budget line after $\bar{x}_1$ will become flatter, because we are dividing smaller amount on greater amount eg:

$$-\frac{(P_1 - S)}{P_2} \Rightarrow \frac{\text{Rise}\downarrow}{\text{Run}}$$

Graphically:



Completed & Revised

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Chapter # 03 {Preferences}

We saw in Chapter 02 that the economic model of consumer behavior is very simple: People choose the best things they can afford. The last Chapter was devoted to clarifying the meaning of "can afford," and this Chapter will be devoted to clarifying the economic concept of "best things".

We need to clarify the economic concept of "best things". We call the objects of consumer choice consumption bundles: A complete list of the goods and services that are involved in the choice problem that we are investigating.

↳ Let x_1 denote the amount of good 1 and x_2 denote the amount of other. The complete consumption bundle is therefore denoted by

(x_1, x_2)
So, we need to investigate all (x_1, x_2) combinations which are on the budget line or below the budget line.

→ Consumer preference:
(Focusing on only 1 consumer)

- Preference:
Relationship (or ranking) between consumption bundles. The consumer can rank them as to their desirability.

Given two bundles,
$X = (x_1, x_2)$ and $Y = (y_1, y_2)$

1) $(x_1, x_2) \succ (y_1, y_2)$:
X is strictly preferred to Y: If the consumer prefers one bundle to another, it means that he or she would choose one over the other, given the opportunity.

2) $(x_1, x_2) \sim (y_1, y_2)$:

X is indifferent to Y: the consumer would be just as satisfied, according to her own preferences, consuming the bundle X as she would be consuming the other bundle, Y.

3) $(x_1, x_2) \succeq (y_1, y_2)$:
X is weakly preferred to Y.

Lets make it simple through examples.

Ex: $(x_1, x_2) = (1\text{ apple}, 3\text{ oranges})$
$(y_1, y_2) = (3\text{ apples}, 1\text{ Oranges})$

i) $(x_1, x_2) \succ (y_1, y_2)$: Consumer likes oranges more then apples.
$(1a, 3o) \succ (3a, 1o)$

ii) $(x_1, x_2) \sim (y_1, y_2)$: Consumer likes apples and oranges equally & fruit is the only thing she care.
$(1a, 3o) \sim (3a, 1o)$

iii) $(x_1, x_2) \succeq (y_1, y_2)$
$(1a, 3or) \succeq (3a, 1or)$: Consumer prefer to have 4 fruits but if she has the chance, she will prefer the bundle which has more oranges. (weakly).

These relations of strict preferences, weak preference and indifference are not independent concepts; the relations are themselves related.

important

1) $X \succeq Y \Leftrightarrow X \succ Y$ or $X \sim Y$
weakly — strongely — indifferent.
not possible to say $Y \succ X$

2) $X \sim Y \Leftrightarrow X \succeq Y$ and $Y \succeq X$

3) $X \succ Y \Leftrightarrow X \succeq Y$ but not $Y \succeq X$.

⇒ Assumptions and preferences:
We usually make some assumptions about the "consistancy" of consumers' preference.

Some of the assumptions about preference are so fundamental that we can refer to them as "axioms" of consumer theory.

Axiom 1:

i) **Complete:-**

We assume that any two different bundles can be compared.

$(x_1, x_2) \succeq (y_1, y_2) \succeq$ or $(y_1, y_2) \succeq (x_1, x_2)$ or both

$x \sim y$ means $(x_1, x_2) \sim (y_1, y_2)$.

ii) **Reflexive:**

We assume that any bundle is at least as good as itself.

Given that X, $(x_1, x_2) \succsim (x_1, x_2)$.

iii) **Transitive:-**

If a consumer thinks that X is at least as good as Y and Y is at least good as Z, then the consumer thinks that x is at least as good as z

if $(x_1, x_2) \succeq (y_1, y_2)$ and

$(y_1, y_2) \succeq (z_1, z_2)$, then we

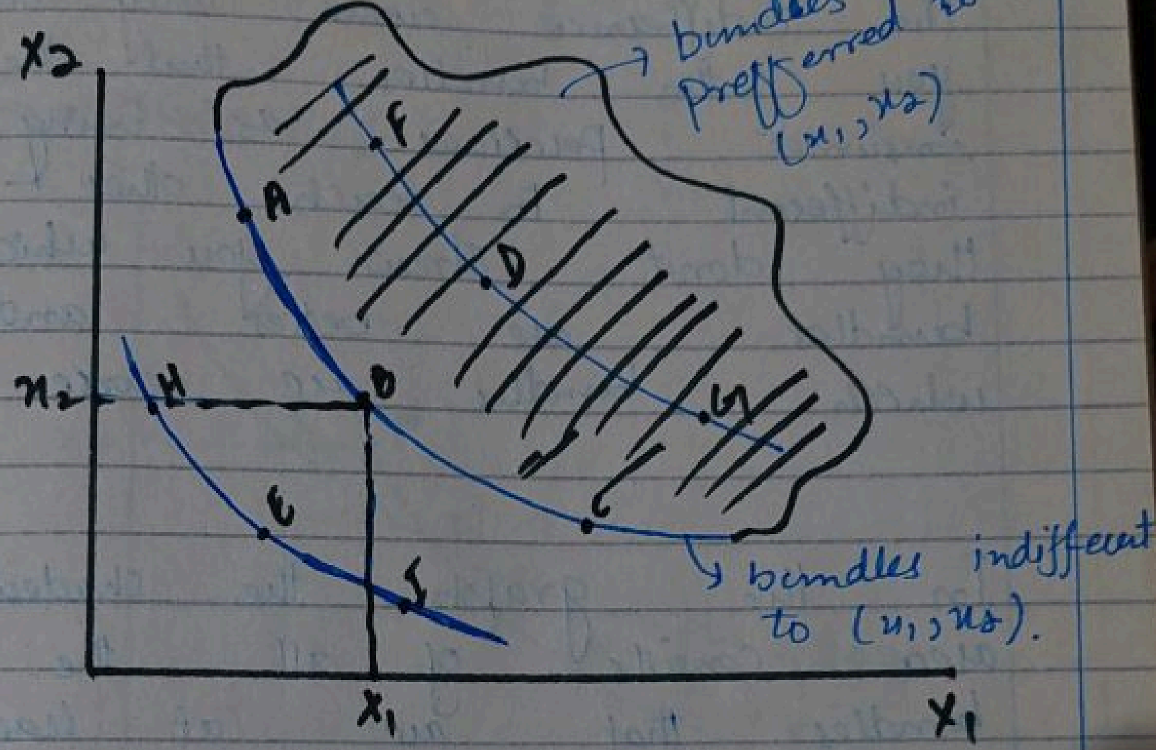
can assume that

$$(x_1, x_2) \succeq (z_1, z_2)$$

⇒ • Indifference curve :

An indifference curve shows a combination of two goods that gives a consumer equal satisfaction and utility thereby making a consumer indifferent. Along the curve, the consumer has an equal preference for the combinations of goods and is indifferent about any combination of goods on the curve.

We will find it convenient to describe preferences graphically by using a construction known as indifference curves.



Weakly Preferred set:

This above graph is about weakly prefered set. Pick a certain consumption bundle (x_1, x_2) and shade in all of the consumption bundles that are weakly prefered to (x_1, x_2)

Weakly means ⇒ Either strictly preferred or indifferent.

The bundles on the boundary of this set – the bundles for which the consumer is just indiffeent to (x_1, x_2)

— forms the indifference curve.

The indifference curve only show you the bundles that the consumer percieves as being indifferent to each other & they don't show you which bundles are better and which bundles are worse.

In the graph the shaded area consists of all the bundles that are at least as good as the bundles (x_1, x_2)

In the graph $A \sim B \sim C$ but

$D \succ A \sim B \sim C$ and $A \sim B \sim C \succ E$

So we can say that

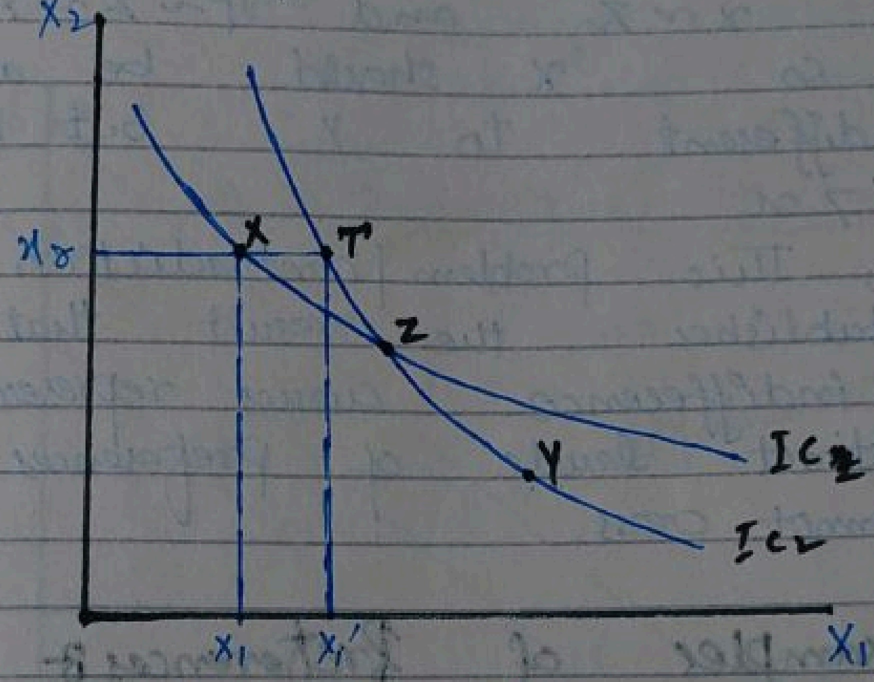
$\boxed{F \sim D \sim G \succ A \sim B \sim C \succ H \sim E \sim I}$

⇒ **Principle of Indifference curves**

(Important Principle).

"Indifference curves representating distinct levels of preference cannot cross".

→ Graphically:



In order to prove this, let us choose three bundles of goods X, Y and Z

Here we know that

i) $x \sim z$ and $T \sim z \sim y$

and here we can say that : $T > x$ because T gives more quantity of x_1 good.
So, the problem arise

because here the axiom of Transitivity doesn't proved.

It should be like this that
$x \sim z$ and $T \sim z \sim y$
so x should be as indifferent to y but here $T > x$

So, This problem | contradiction establishes the result that indifference curves representing distinct levels of preferences cannot cross.

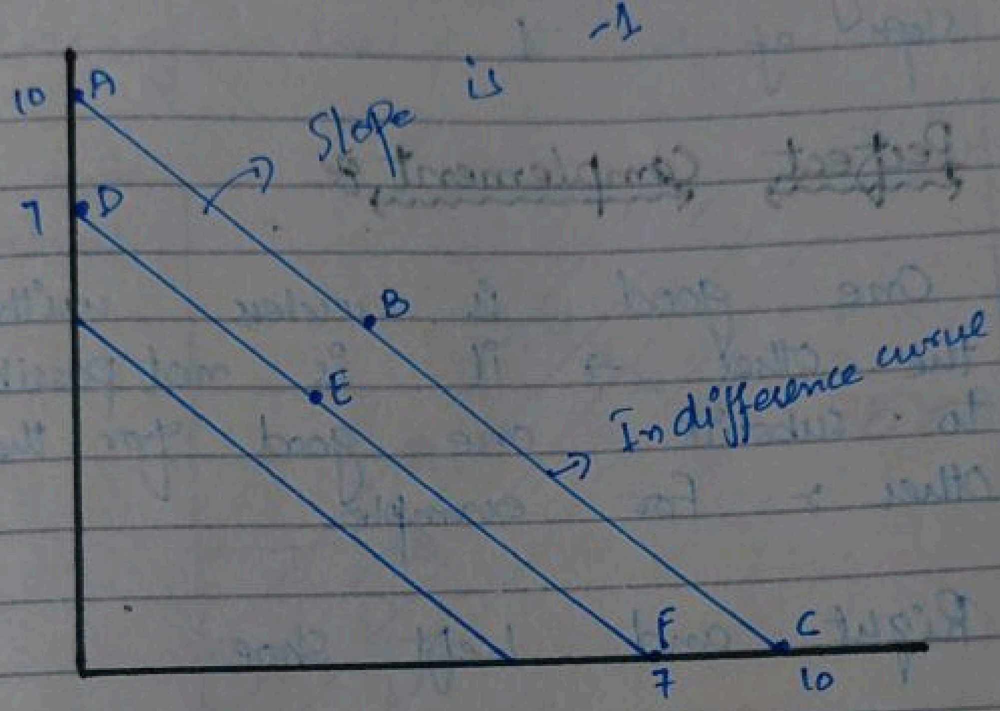
⇒ Examples of Preferences :

i) Perfect Substitutes :

Consumer likes two goods equally so only the total number of goods matter — 2 goods are perfectly substitutable.

For example : If we have 2 pencils red and blue and both are perfectly substitutes of one another so the only thing matters is the number of pencils and not colours so.

Graphically :



Two goods are perfectly substitutes if the consumer is willing to substitute one good for the other at a constant rate

↳ In the above graph A ~ B ~ C because they are at same IC and gives number of 10 pencils.

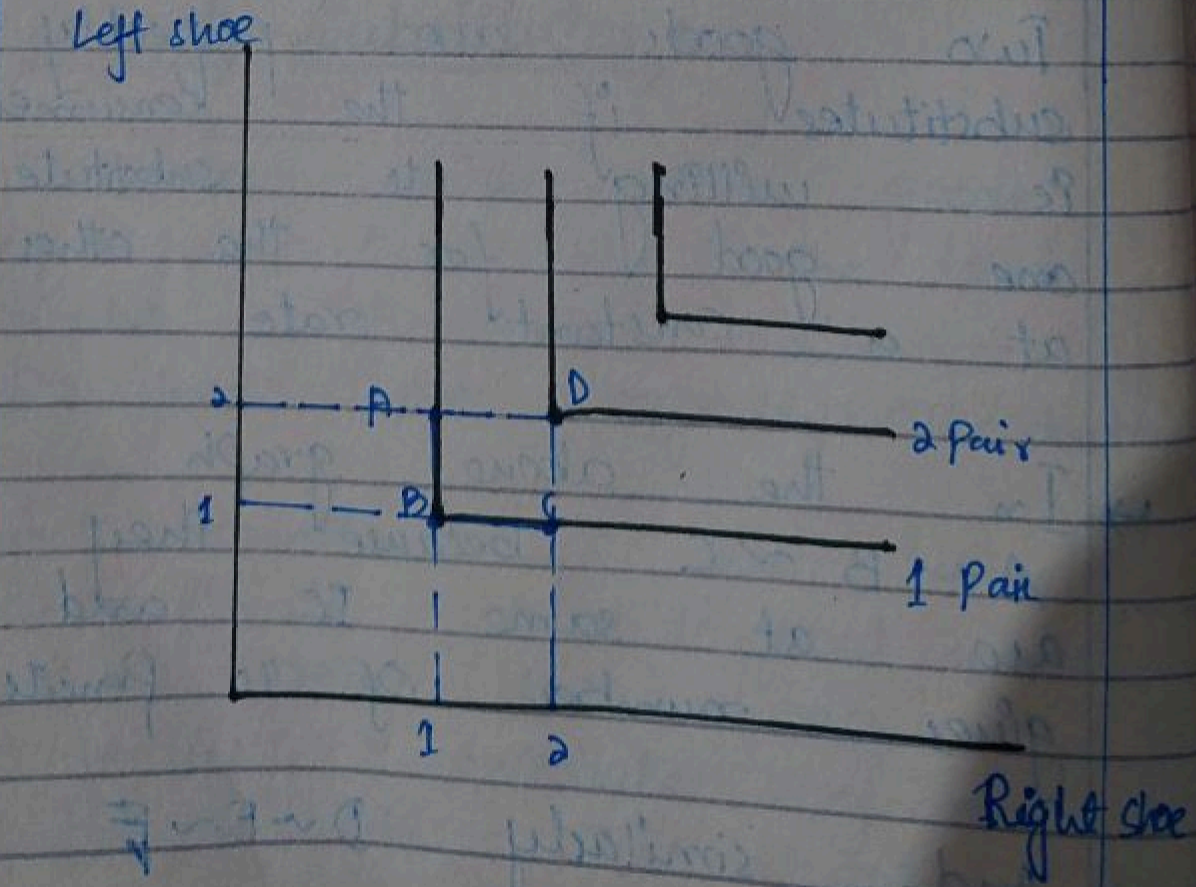
↳ And similarly D ~ E ~ F

Here the consumer only cares about the total number of pencils, not about their colors. Thus the indifference curves are straight line with a slope of -1.

2) Perfect Complements

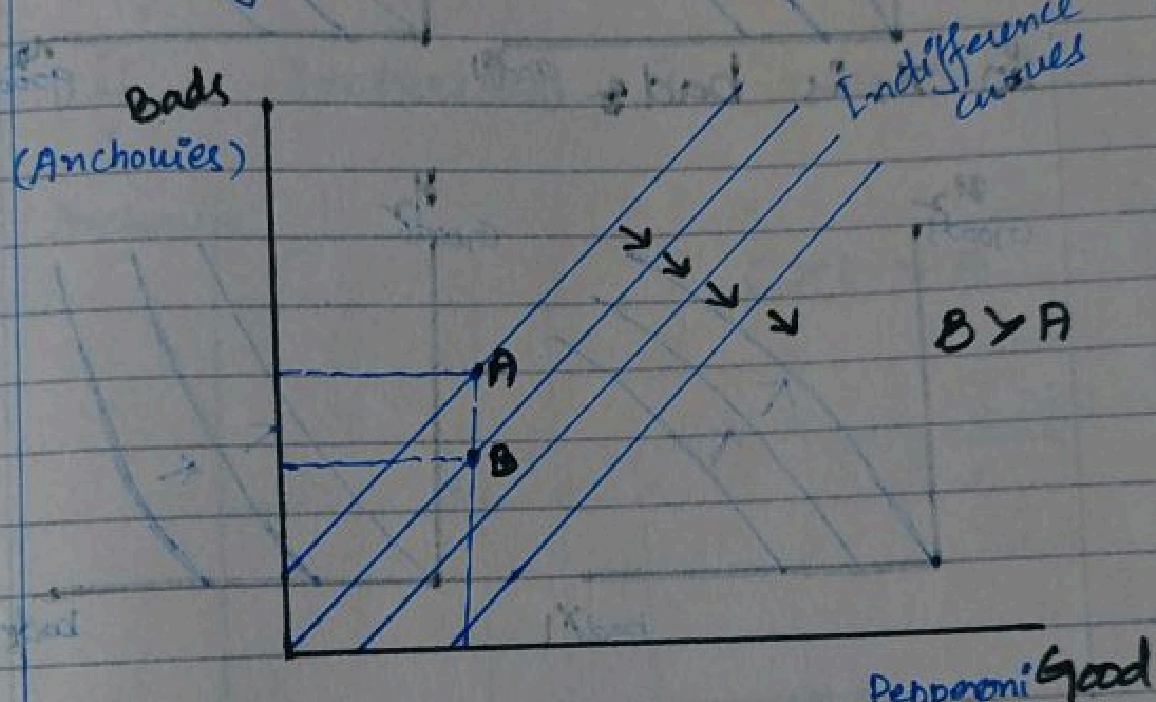
One good is useless without the other → it is not possible to substite one good for the other :- For example.

Right and left shoe.



$A \sim B \sim C \rightarrow$ 1 Pair
$D \succ A \sim B \sim C \rightarrow$ 2 Pair.

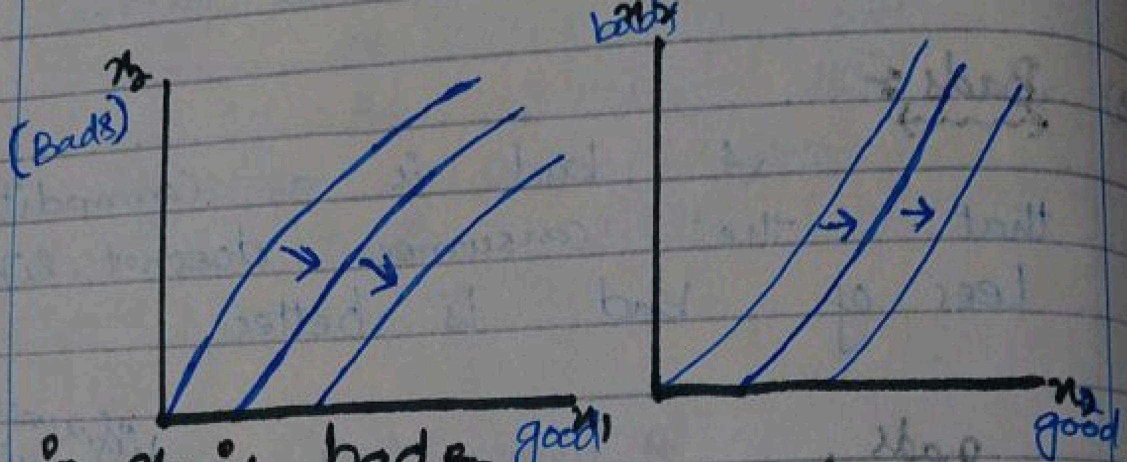
3) **Bads:**
A bad is a commodity that the consumer doesn't like. Less of bad is better.



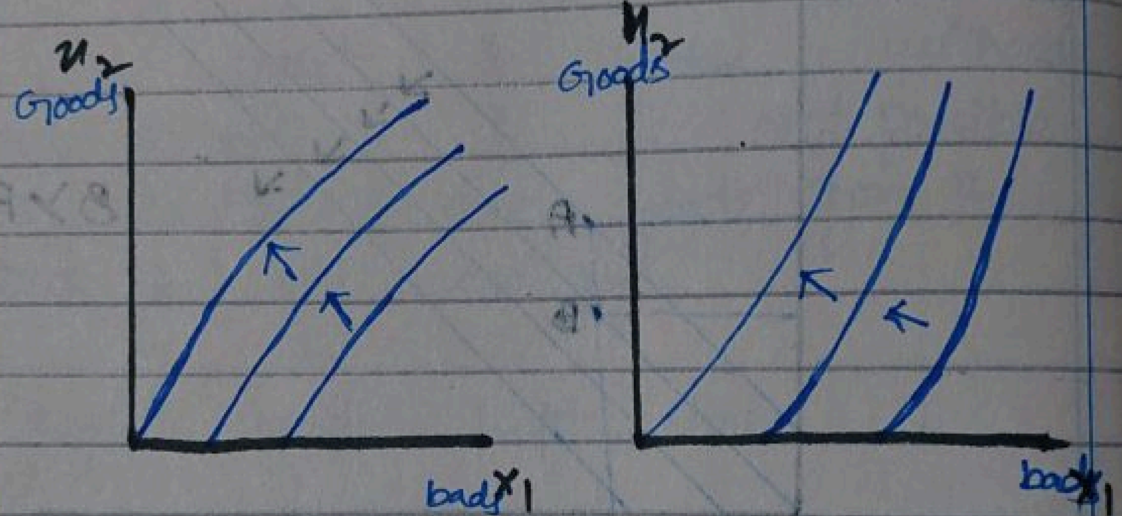
Here Anchovies are "bad" and pepperoni is a "good" for this consumer. Thus the indifference curve have a positive slope.

Any positively sloped Indifference curve represents "Bads".

Such as →



i) x_2 is bads



ii) x_1 is bads

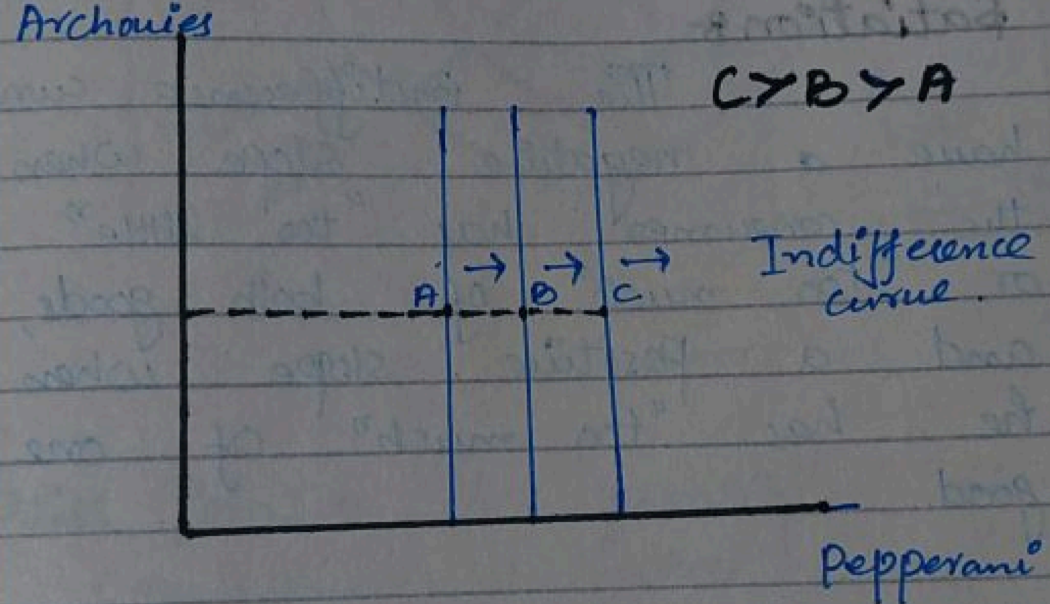
In (i) x_2 is bad so consuming x_2 less is batter for him.
and similaely in (ii).

But mainly as long ~~as long~~ I am having a positively sloped indiffeance curve, I will always have one is good as a bad.

4) **Neutrals:**

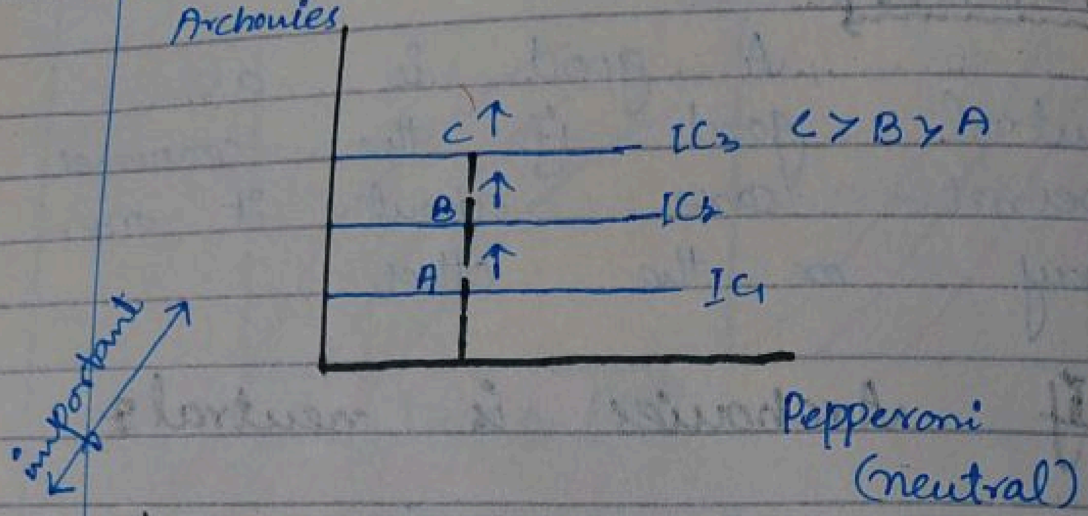
A good is a neutral good if the consumer doesn't care about it one way or the other.

If Anchovies is neutral:



In this the consumer likes pepperoni and is neutral about anchovies, so increasing pepperoni is making consumer better but ↑ anchovies will have no effect because the consumer is neutral about its consumption.

→ If Pepperoni is neutral

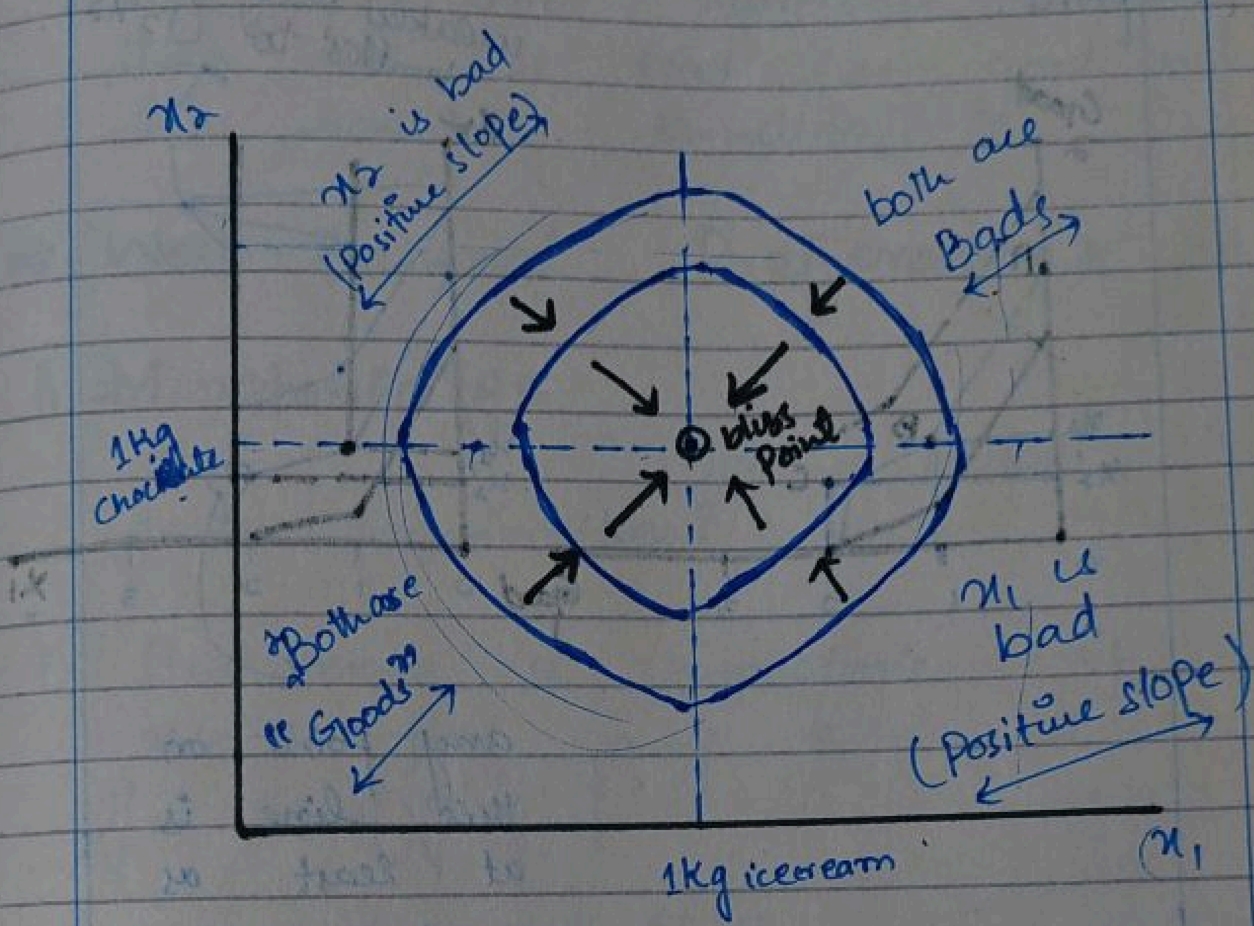


→ 5) Satiation:

↳ The indifference curve have a negative slope when the consumer has "too little" or "too much" of both goods, and a positive slope when he has "too much" of one good.

↳ When he has too much of one of the good, it becomes a bad - reducing the consumption of the bad goods moves him closer to his "bliss point"

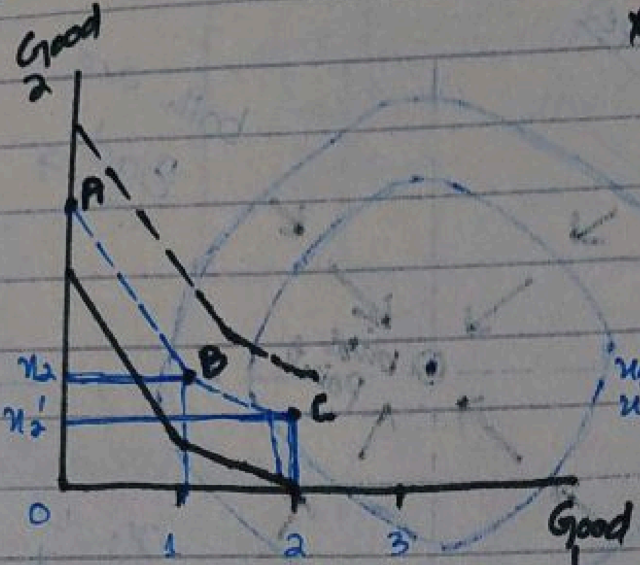
↳ If he has too much of both goods, they both are bads, so reducing the consumption of each moves him closer to the bliss point.

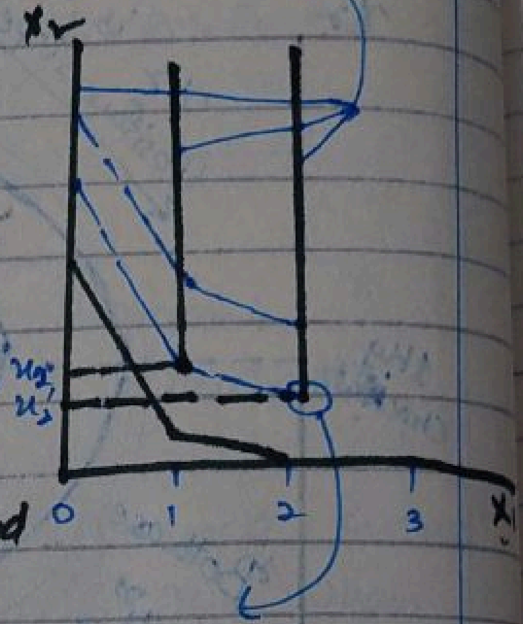


- **Bliss Point:** A quantity of consumption where any further increase would make the consumer less satisfied.

→ 5) **Discrete goods:**

Suppose that x_2 is money to be spent on other goods and x_2 is a discrete good that is only available in integer amounts. The bundles indifferent to a given bundle will be a set of discrete point.





A $(0, m)$
B $(1, x_2)$
C $(2, x_2)$

$$A \sim B \sim C$$

Points at A, B, C are showing indifference of the consumer.

→ Here good 1 is only available in integers amount. In Panel A the dashed lines connect together the bundles that are indifferent, and in B the verticle lines represents bundles that are at least as good as the indicated bundles.

⇒ Well-Behaved Preferences:

i) Monotonicity:

"More is better"

"goods commodities":

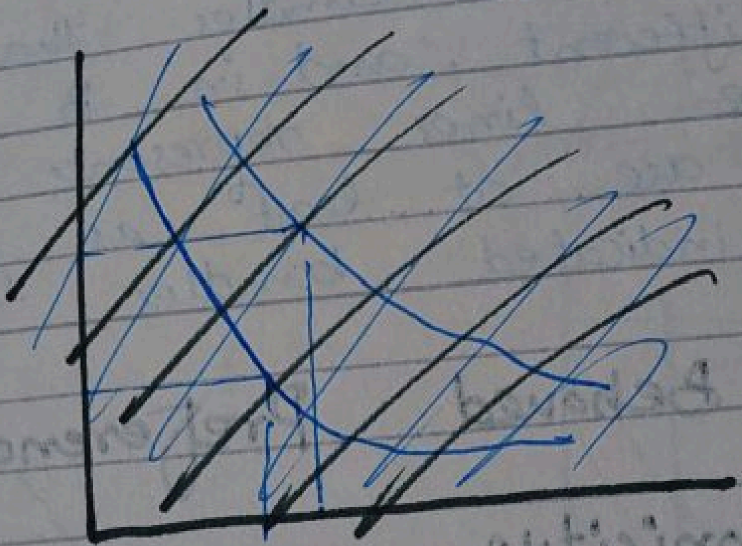
i) Preference is monotonic if $x \geq y$ for any x and y satisfying

$$x_1 \geq y_1 \; , \; x_2 \geq y_2$$

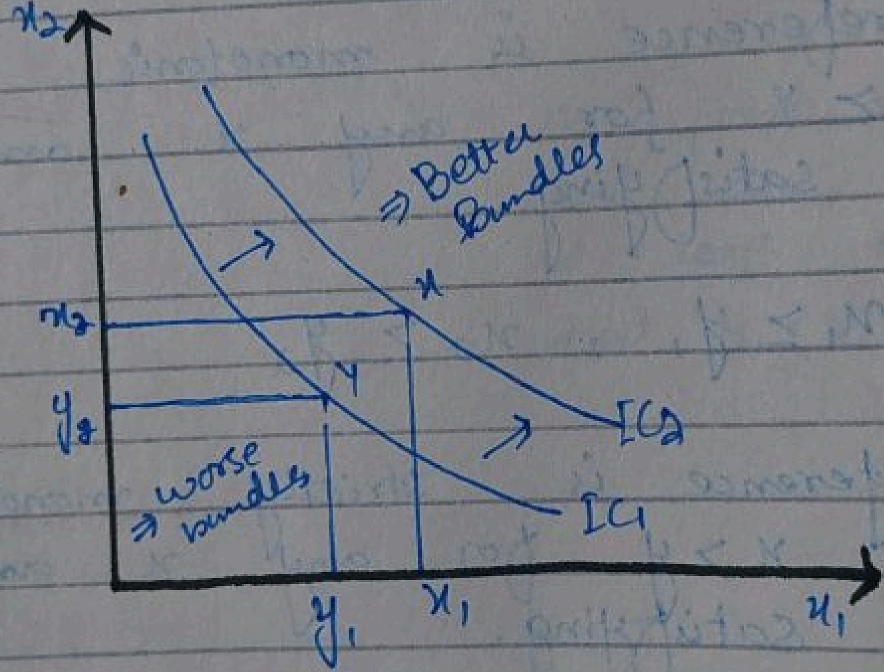
ii) Preference is strictly monotonic if $x > y$ for any x and y satisfying.

$$x_1 > y_1 \; , \; x_2 > y_2 \; , \text{and } x \neq y.$$

⇒ Monotonicity implies that the indifference curves have a negative slope.



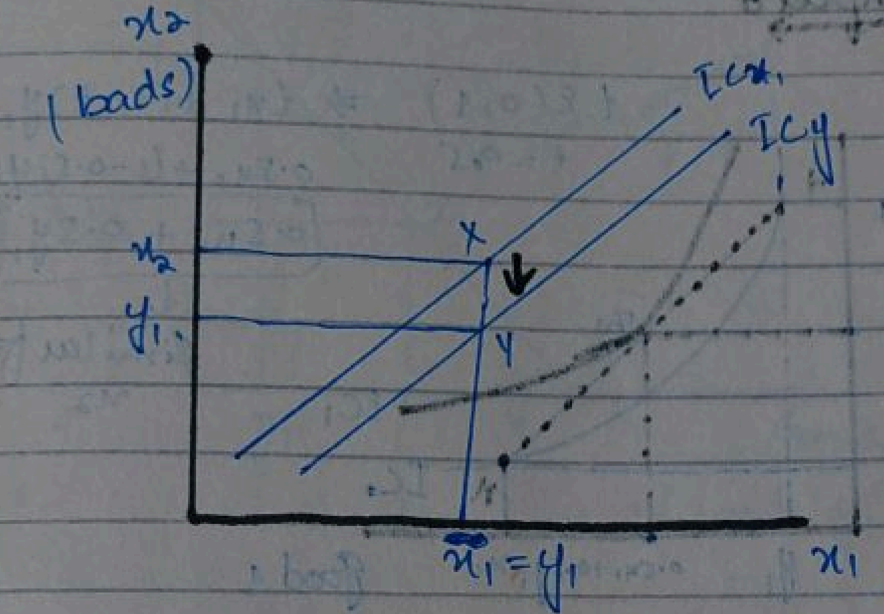
(Goods)



$x > y$ so monotonicity is satisfied.

More of the both goods is a better bundle for this consumer : Less of both goods represent a worse bundle.

Bads:-



Here ICy is better then ICx because x_2 is bad. so "Less is better".

"Monotonicity is Violated"

a) **Convexity:**
"Moderates are better than extreams"

→ Preference is convex if for any (on same IC) (x_1, x_2) and (y_1, y_2), if $\boxed{(x_1, x_2) \sim (y_1, y_2)}$

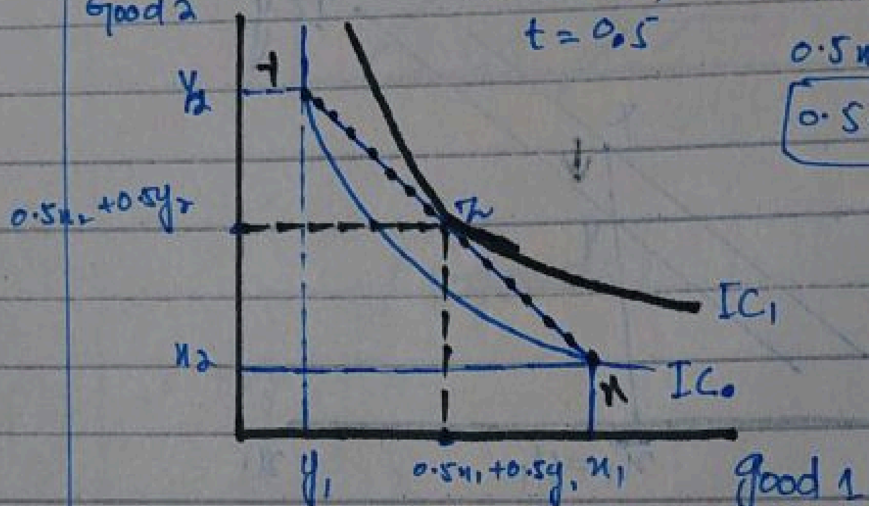
$\{tx_1 + (1-t)y_1\}, (tx_2 + (1-t)y_2) \succsim (x_1, x_2)$
for all $t \in (0,1)$

↓ b/w 0–1

It means that the set of bundles weakly preferred to (x_1, x_2) is a convex set.

→ **Examples** :

i) $t \in (0,1) \Rightarrow tx_1 + (1-t)y_1$
$t = 0.5$



$0.5x_1 + (1-0.5)y_1$

$\boxed{0.5x_1 + 0.5y_1}$

↓

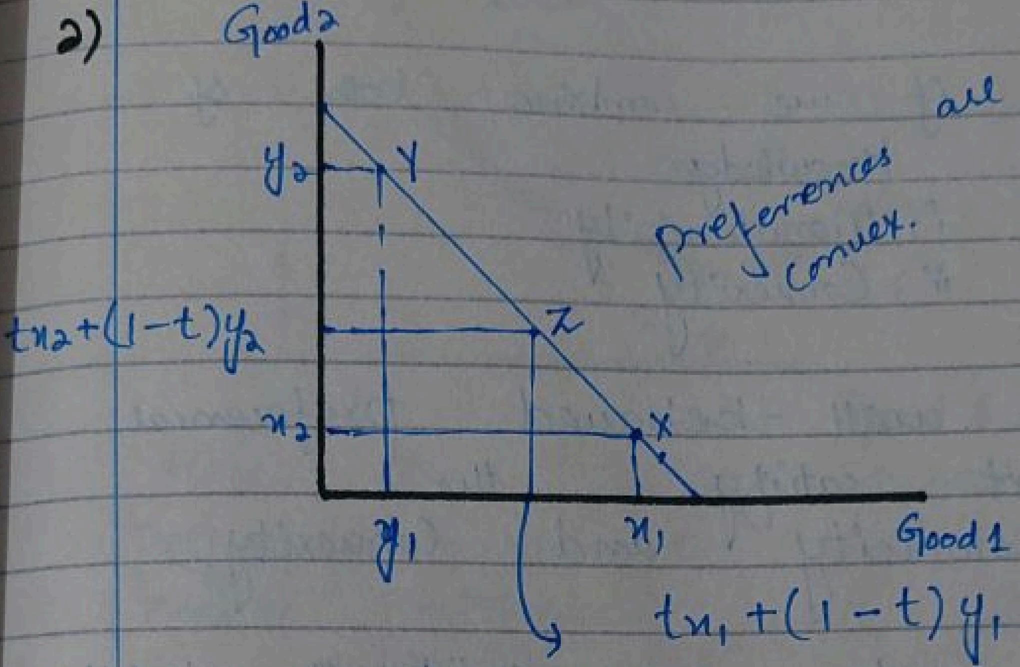
Similar for x_2.

Here $\left.\begin{matrix} z > x \\ z > y \end{matrix}\right\}$ Preferences are strictly convex.

→ The points on the line which is directly b/w x and y, then it will be preferred strictly and any point on that line, it will always satisfy the convexity.

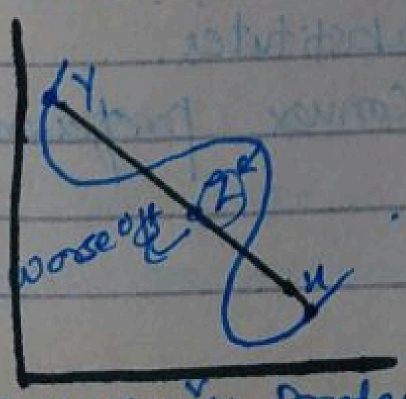
→ If the average bundle (z) makes the consumer Better off : Preferences are strictly Convex.

2)

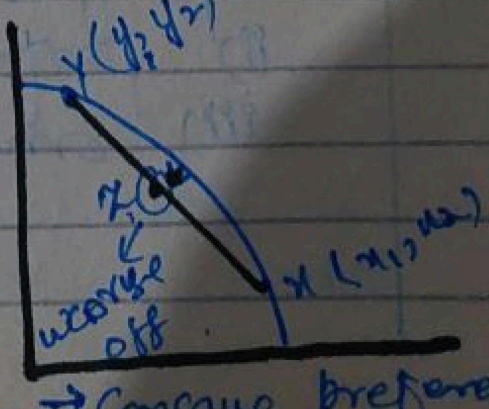


If the averaged bundle Z is not making the consumer worse off as its on the same indifference curve, then preferences are Convex.

→ So when the average bundle makes the consumer worse off then the preferences are not convex. such as.



→ non convex preferences



→ Concave preferences

Shortly:

⇒ Well-behaved Preferences:

So, if we combine both of the knowledge
i) Monotonicity.
ii) Convexity

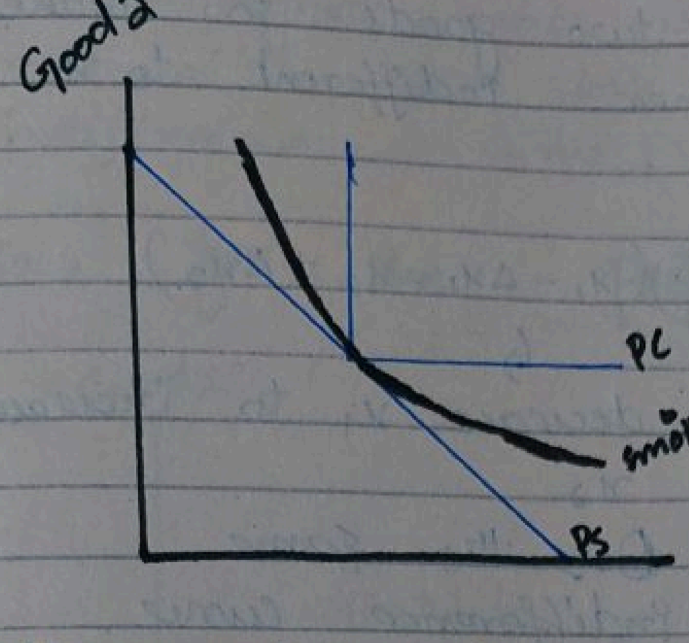
↳ So, well-behaved preferences must satisfy the monotonicity and Convexity.

↳ So, when we satisfy both monotonicity and Convexity, then we can say that the consumers preferences are well — behaved. (at the same time)

→ **Examples:**

So, the best or easy examples of the well behaved preferences are

i) perfect Complements.
ii) Perfect substitutes.
iii) Smooth convex preferences.



Here the Perfect substitutes, Perfect complements and Smooth Convex preferences all satisfy the monotonicity and Convexity, so, they are all Well-Behaved.

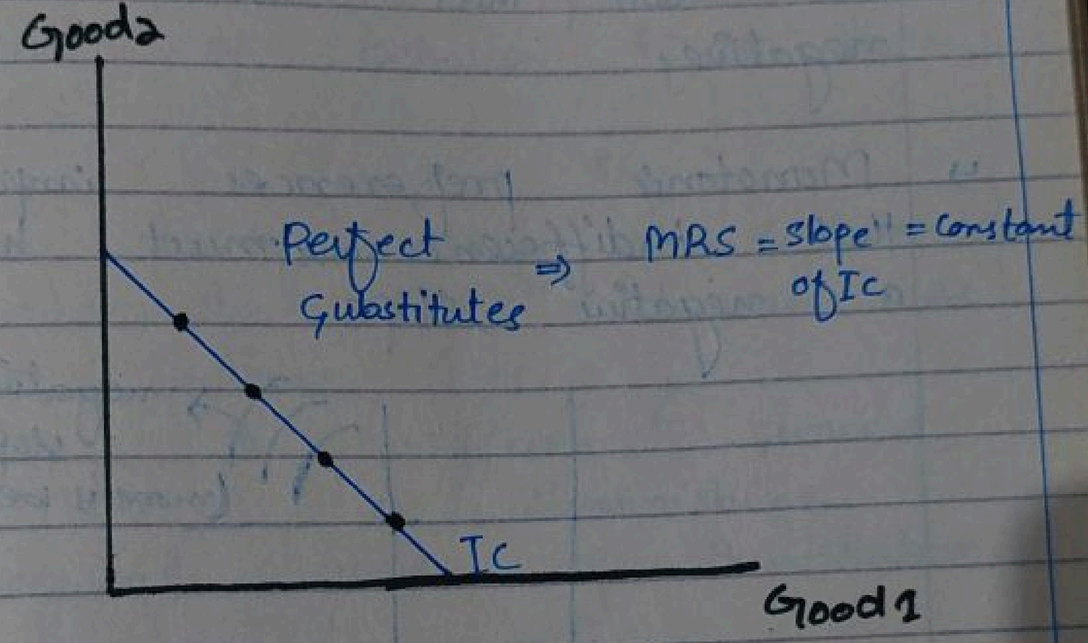
⇒ Marginal Rate of Substitution (MRS) :

The marginal rate of substitution (MRS) is the amount of a good that a consumer is willing to consume compared to another good.

4. Marginal rate of substitution at a given bundle x is the marginal exchange rate

The marginal rate of substitution measures the slope of the indifference curve.

⇒ So, for the perfect substitutes



↳ For the perfect substitutes because I have a constant slope of indifference curves, I have the constant MRS.

↳ But if the slope of Indifference curves is not constant the MRS will also be not constant.

⇒ The marginal Rate of Substitution (MRS) is that it is between two goods to make the consumer indifferent to x.

$$(x_1, x_2) \sim (x_1 - \Delta x_1, x_2 + \Delta x_2)$$

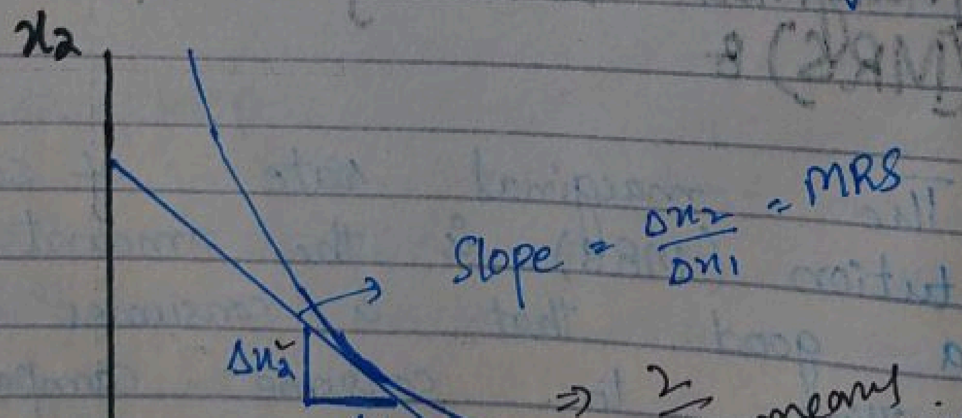
decrease x_1 to increase x_2

On the same indifference curve.

MRS at $x = \lim_{\Delta x_1 \to 0} \frac{\Delta x_2}{\Delta x_1}$ = slope of indifference curve at x.

Marginal

Rate of exchange.

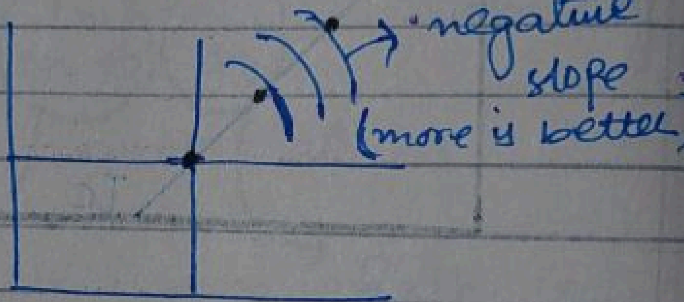


$\Rightarrow \frac{2}{1}$ means through this indifference curve one $x_1 = 2x_2$

typically a negative number.

- because if we have to increase good 1 who have to decrease good 2. that's the reason that MRS is negative.

↳ Monotonic preferences imply that indifference curves must have a negative slope.



↳ Since the MRS is the numerical measure of the slope of an indifference curve, it will naturally be a negative number.

* So, for all well-behaved preferences, MRS must be negative.

* To have more x_2, I have to give up some x_1 or

vice virsa.

→ Slope of Convex Preferences.

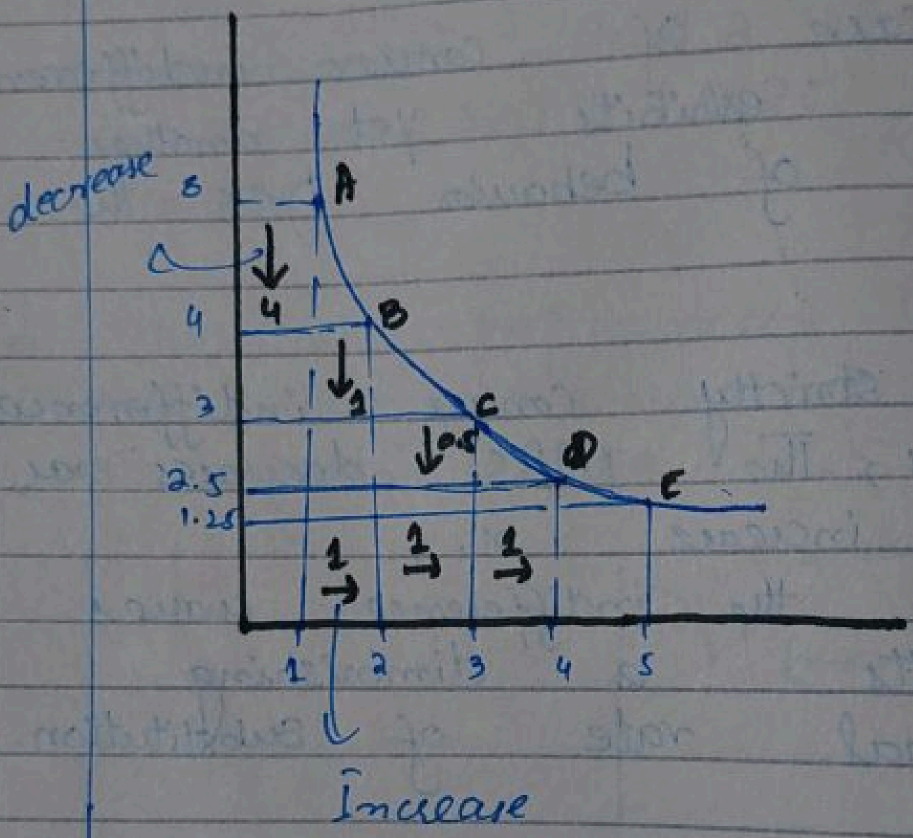
↳ The case of convex indifferernce curves exhibits yet another kind of behavior for the MRS.

↳ For strictly convex indifference curves, The MRS decreases as we increase x_1.
Thus the indifference curves exhibits a diminishing marginal rate of substitution.

↳ This means that the amount of good 1 that the person is willing to give up for an additional amount of good 2 ~~So the amount of good 2 will increase~~.
increases the amount of Good 1 ~~increases~~. Decreases

⇓

↳ This means that if I would like to have more and more x_1 the demand of x_2 I have to give up will decrease such as.



i) A - B ⇒ +1 x_1 and -4 x_2

ii) B - C ⇒ +1 x_1 and -1 x_2

(iii) C - D +1 x_1 and -0.5 x_2

So the more I have x_1 less I am willing to give up of x_2

⇒ So, To increase x_1 by

1 unit, I will be willing to give up less and less x_2 when x_1 increases.

Therefor in absolute value the slope of my indifference curve is decreasing If I keep increasing x_1, that means I have a diminishing MRS.

$$\frac{\Delta x_2}{\Delta x_1} = \frac{4}{1} = 4$$

$$\frac{\Delta x_2}{\Delta x_1} = \frac{1}{1} = 1$$

$$\frac{\Delta x_2}{\Delta x_1} = \frac{0.5}{1} = 0.5$$

marginal rate of substitution is diminishing.

Completed
Revised

⇒ Completed, 8

~d***B~

{Chapter # 05}

Utility ~~Maximization~~ Choice

→ Introduction:

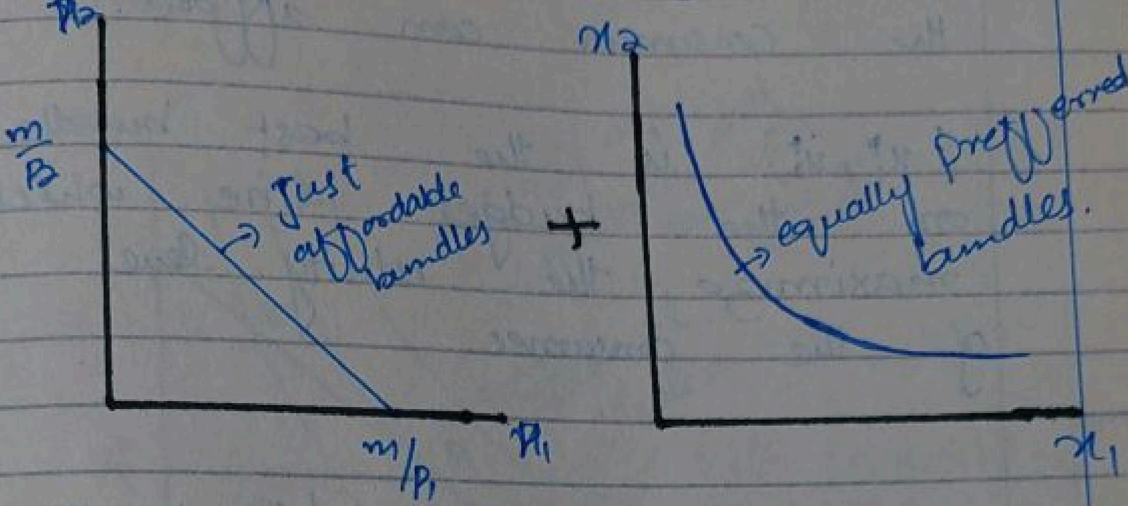
The economic model of consumer choice is that the people choose the best bundle they can afford.

⇒ " Consumers choose the most preferred bundle from their budget sets."

↳ In the previous two Chapter we talk about the affordable bundles which is given by Budget line and then we say that the preferences creates the indifference curves

And the aim of this Chapter is to combine these two knowledges in order to find the

best and affordable bundle
:- Combine BL and IC.

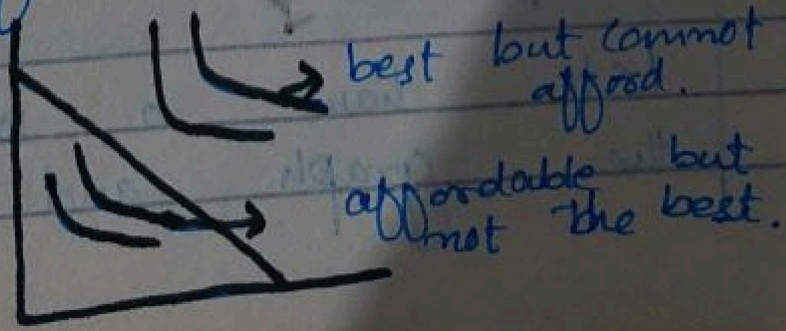


→ Consumer's Problem :

- The consumers problem is to maximize utility $u(x_1, x_2)$ subject to the budget set $(p_1x_1 + p_2x_2 \leq m)$.

- And at the end of such maximization, the choice (x_1^*, x_2^*) is an optimal choice for the consumer.

- The set of bundles that she prefers to (x_1^*, x_2^*) doesn't intersect the bundles she can afford



Thus the bundles (x_1^*, x_2^*) is the best bundles that the consumer can afford.

(x_1^*, x_2^*) is the best bundle on the budget line which maximize the utility level of the consumer.

↳ max $u(x_1, x_2)$ → highest utility (Best).

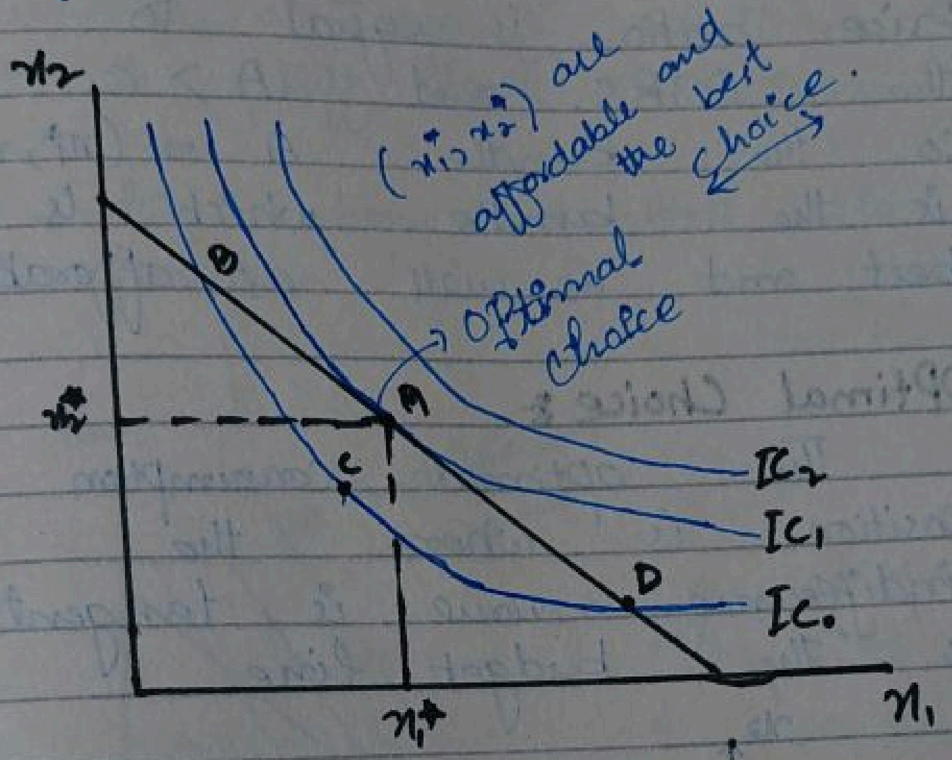
Such that
$p_1x_1 + p_2x_2 = m$ → enough budget (affordable).

↳ Both the x_1^* and x_2^* depends on (p_1, p_2 and income m).

So, if p_1, p_2, or m changes, the optimal choices (x_1^* and x_2^*) might be effected).

→ **Graphically:**

lets have a look to the graph and ~~have~~ how we explain such utility maximization by using a Graph.



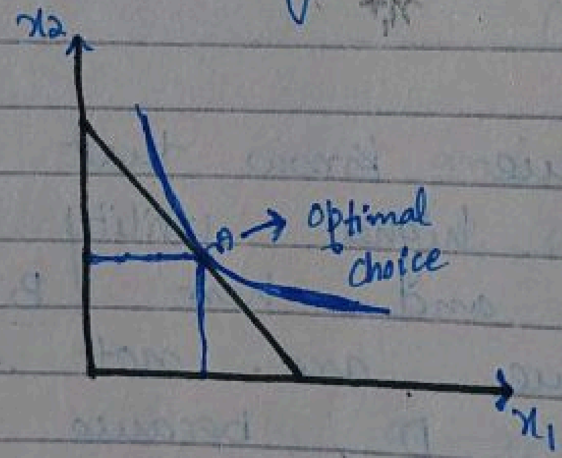
Here we know that IC_1 is giving higher utility then IC_0 and here $B \sim C \sim D$ here we are not choosing B and D because we can use less money to achieve this utility such as C because "C" is point where we can get the same utility by spending less money then B and D.

Here the Point A is the

optimal choice because here $-\frac{P_1}{P_2}$ = MRS, means the Price ratio is equal to the MRS. and A > C. so the bundle A ⇒ (x_1^*, x_2^*) is the bundle which is best and as well as affordable.

↳ **Optimal Choice :**

The optimal consumption position is where the indifference curve is tangent to the budget line.



Always true :

At the optimal point the indifference curve can't cross the budget line.

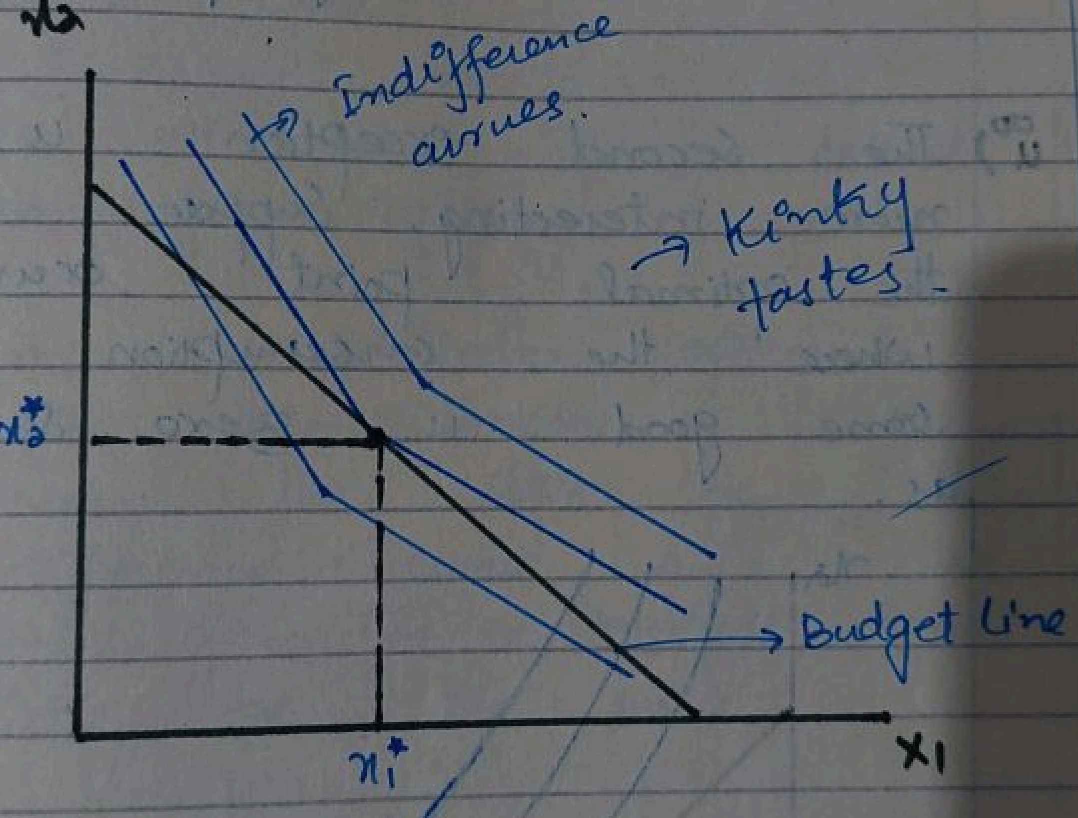
↳ **Does this tangency condition really have to hold at an optimal choice.**

Not in all cases, but it does hold for most interesting cases.

So, the Tangency condition is not a sufficient condition.

So, lets have a look to the examples

4 i)



↳ Here is an optimal consumption bundle where the indifference curve doesn't have a tangent.

↳ Here the indifference curve have a kink at the optimal choice and a of good 2. The indifferce curve is not tangent to the budget line.

Here the slope of the indifference curve and the slope of the budget line are different, but the indifference curve still doesn't cross the budget line.

↳ This optimum is called boundary optimum.

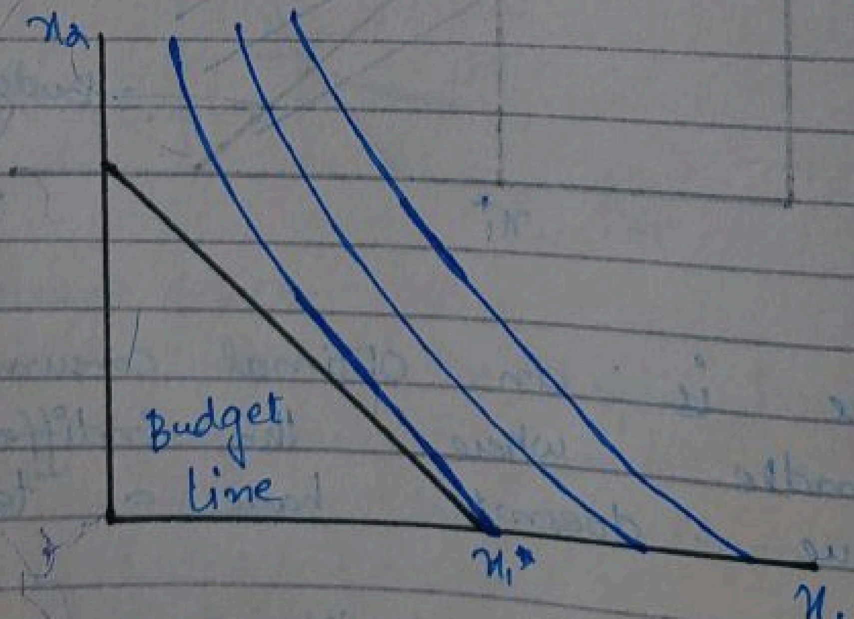
↳ In the interior optimum with the smooth indifference curves, the slope of the indifference curve and the slope of the budget line must be the same.

iii) If we find a bundle where the Indifference curve is tanget to the budget line, can we be sure we have an Optimal Choice?

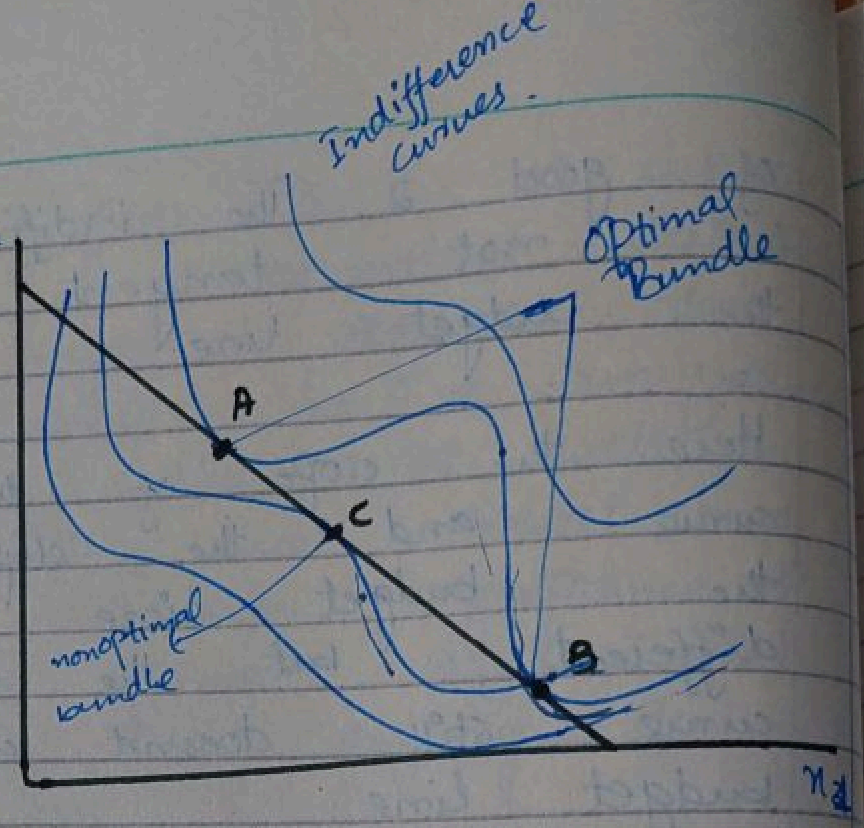
Graphically/8

tangent just is not defined, since the mathematical definition of a tangent requires that there should be a unique tangent line at each point. This case doesn't have much economic significance – it is more a (nuisance) (پریشانی) than anything else.

ii) The second exception is more interesting. Suppose that the optimal point ocurs where the consumption of some good is zero. Such as.



The optimal consumption involves consumption zero units



$A \sim B > C$

More then one tangency:

Here there are three tangencies, but only two optimal points, so the tangency condition is necessary but not sufficient.

↳ One Condition where its sufficient:

There is one important case where its sufficient: the case of convex preferences.

In the case of convex preferences, any point that satisfy the tangency condition must be an optimal point.

If the indifference curves are strictly convex; we have a unique interior optimal choice that satisfy.

$$-\frac{MU_1}{MU_2} = MRS = -\frac{P_1}{P_2} = -\frac{\Delta x_2}{\Delta x_1} \text{ or}$$

$$MU_1 = MU_2 \Delta x_2$$

So, $$\frac{MU_1}{MU_2} = -\frac{P_1}{P_2}$$

slope of the IC = slope of the BL.

↳ If the consumer is at a consumption bundle where he or she is willing to stay put, it must be one where the MRS is equal to this rate of exchange.

↳ Whenever the MRS is different from the price ratio, the consumer cannot be at his or her optimal choice.

→ **Consumer Demand:**

The optimal choice of

good 1 and 2 at some set of prices and income is called the consumer's demanded bundle.

In general when prices and income change, the consumer's optimal choice will change.

↳ The demand function is a function that relates the optimal choice – the quantities demand – to the different values of prices and incomes.

We will write the demand function as depending on both prices and income:

$$x_1(p_1, p_2, m) \quad \text{and} \quad x_2(p_1, p_2, m)$$

For each different set of prices and income, there will be a different combination of goods that is the optimal choice of the consumer.

c) Also, different preferences will lead to different demand function.

⇒ So, we have two important points to understand the consumer demand.

1st ⇒ Prices and Income.
2nd ⇒ Different Preferences.

⇒ **Some Examples:**

In these examples the basic procedure will be the same for each example: Plot the indifference curves and budget line and find the point where the highest indifference curve touches the budget line.

i) **Perfect Substitutes:** In the case of Perfect substitutes, we have three possible cases.

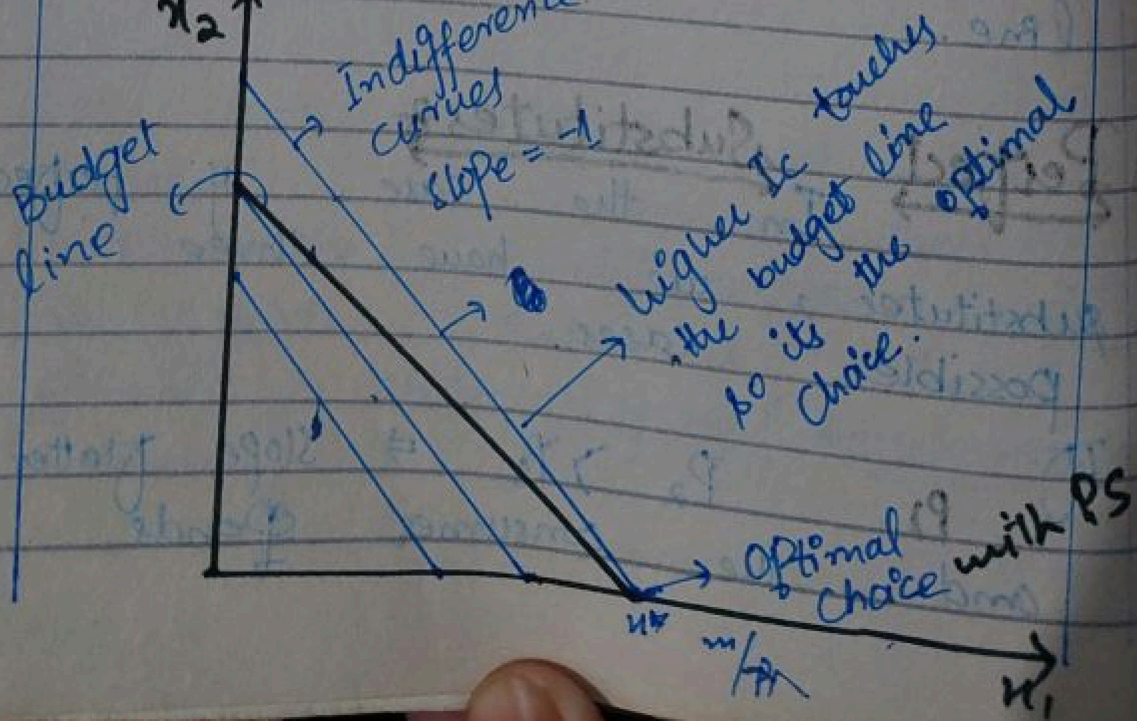
If $P_1 > P_2$ ⇒ Slope flatter and the consumer spends all of his or her money on good 1.

ii) $P_1 > P_2 \Rightarrow$ Steeper then the consumer purchases only good 2.

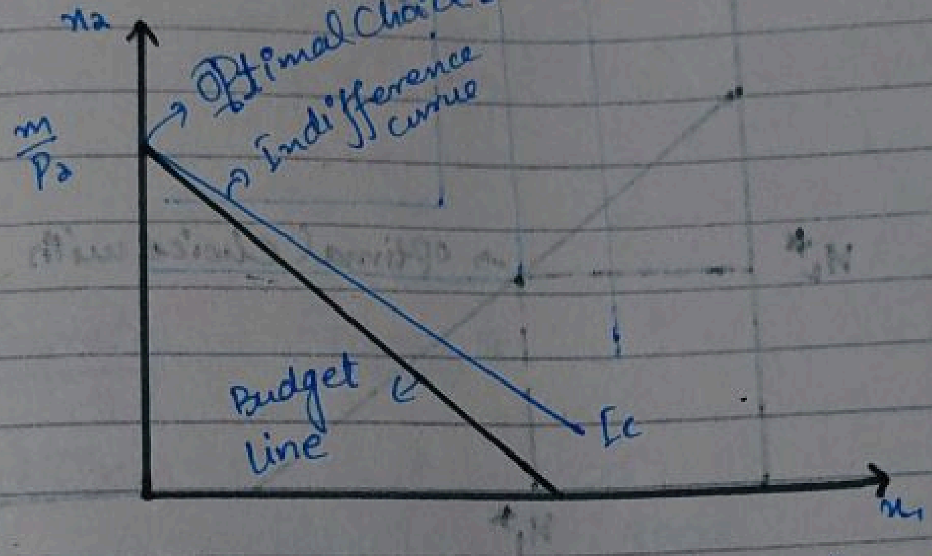
iii) $P_1 = P_2$

In this case there is a whole range of ~~preferences~~ optimal choices - any amount of good 1 and 2 that satisfies the budget constraint is optimal in this case. So, the demand function for good 1 will be.

- $x_1 = \begin{cases} m/p_1 & \text{when } P_1 < P_2 \\ \text{any number b/w 0 \& } m/p_1 & \text{when } P_1 = P_2 \\ 0 & \text{when } P_1 > P_2 \end{cases}$



Here x_1 is ~~cheaper~~ expensive then x_2.

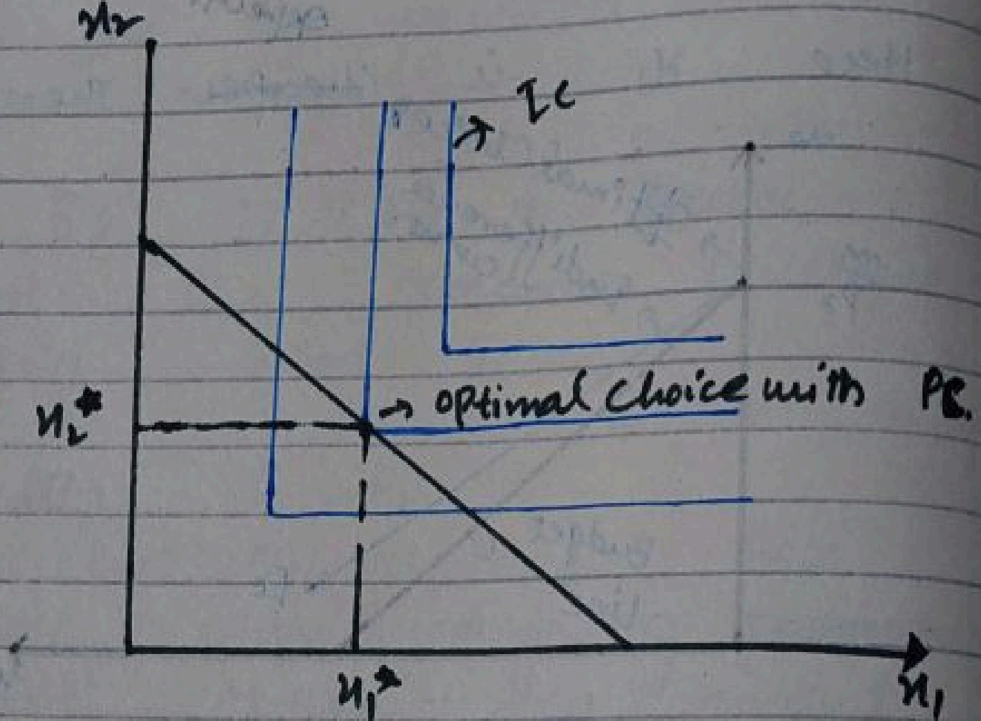


Here x_2 is cheaper then x_1.

ii) **Perfect complements**

In case of perfect complements the optimal choice must always lie on the diagonal, where the consumer is purchasing equal amounts of both goods, no matter what the prices are.

In terms of our example, this says that people with two feet buy shoes in pairs.



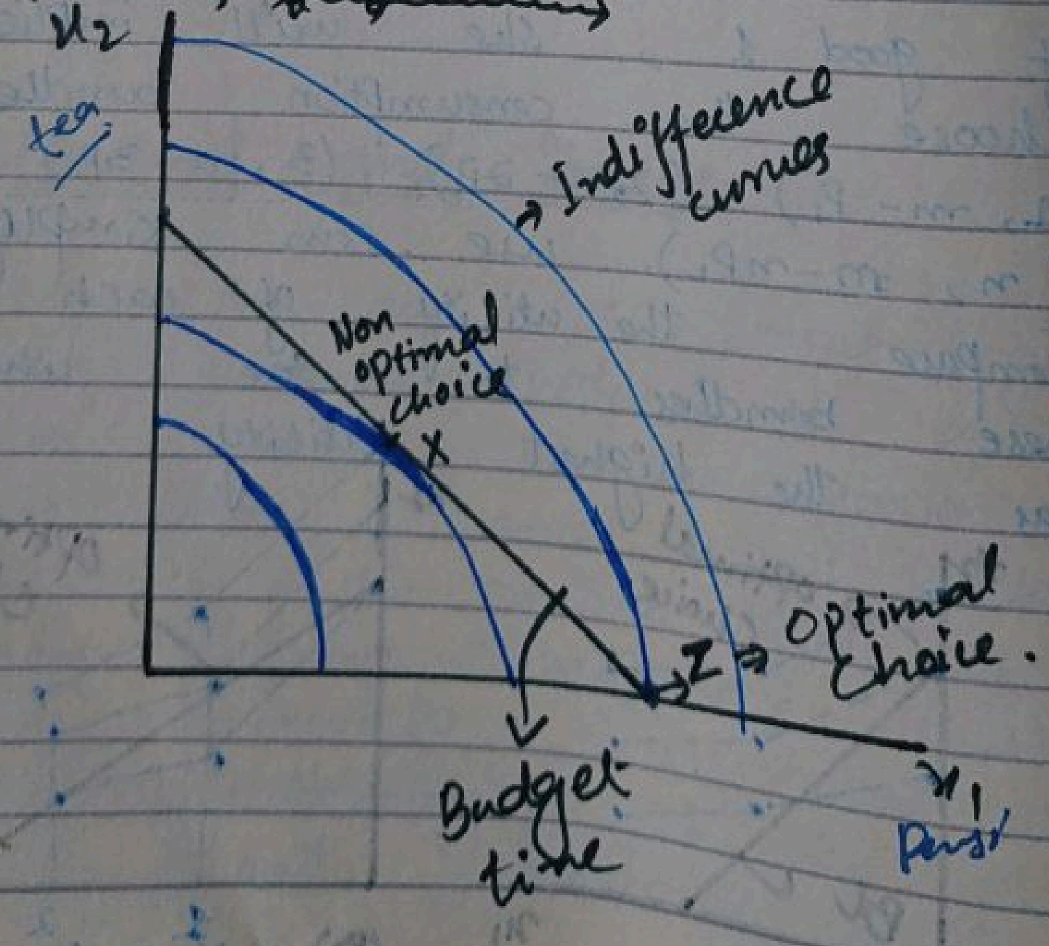
If the goods are perfect complements, the quantities demanded will always lie on the diagonal since the optimal choice occurs where x_1 equals x_2.

iii) **Neutral and Bads**

- In the case of neutral good the consumer spends all of her money on the goods she likes and doesn't purchase any of the neutral good, the same thing happens if one commodity is bad. Thus, if commodity 1 is a good and commodity 2 is

In Graph, as usual, the optimal bundle is the one on the highest indifference curve. If the price of good 1 is very high, then the consumer will choose zero units of consumption; as the price decreases the consumer will find it optimal to consume 1 unit of the good. Typically, as the price decreases further the consumer will choose to consume more units of good 1.

v) Concave preferences:



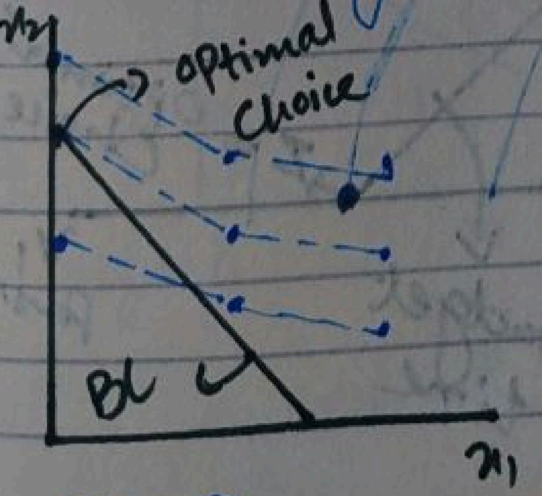
a bad, then the demand function will be.

$$x_1 = m/p_1$$

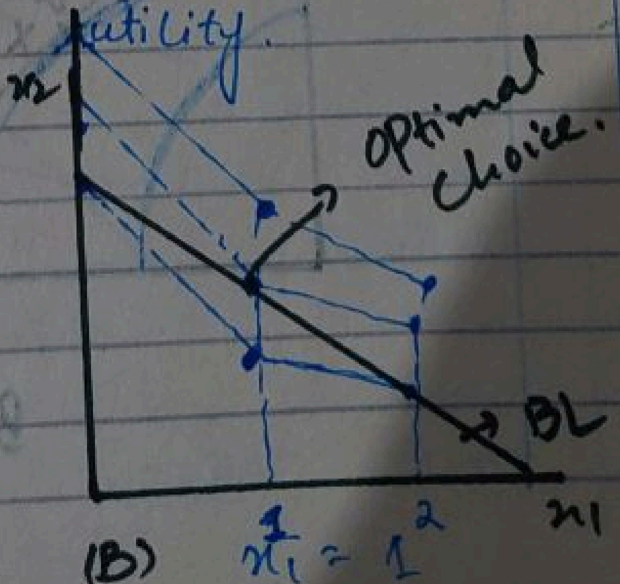
$$x_2 = 0.$$

iv) **Discrete Goods:**

Suppose that good 1 is a discrete good that is available only in integers units, while good 2 is money to be spend on everything else. If the consumer chooses 1, 2, 3 ---- units of good 1, she will implicitly choose the consumption bundles $(1, m - P_1)$, $(2, m - 2P_1)$, $(3, m - 3P_1)$ and $(n, m - nP_1)$. We can simply compare the utility of each of these bundles to see which has the highest utility.



(A) $x_1 = 0$

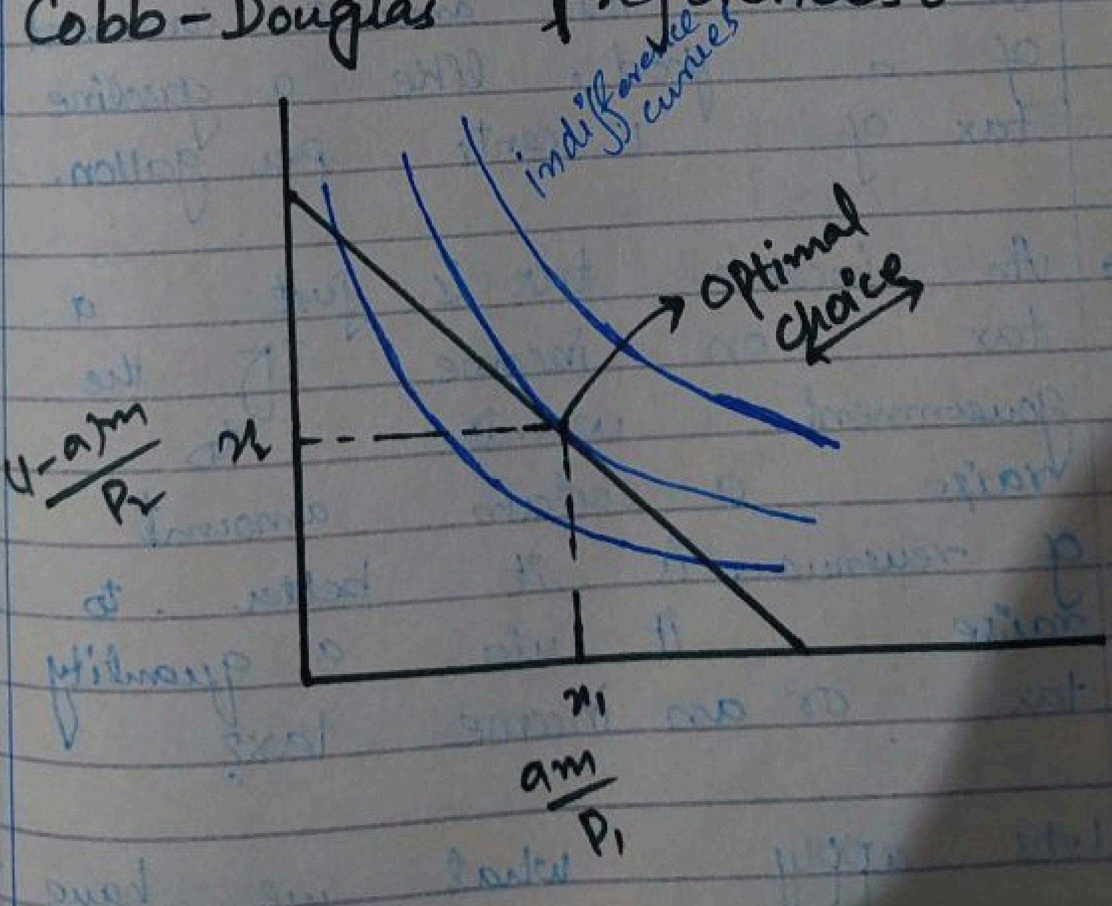


(B) $x_1 = 1$

Is X the optimal choice?
No, the optimal choice is the boundary point, "Z", not the interior tangency point, X, because Z lies on the higher indifference curves.

Think of what non convex preferences mean. If you have money to purchase ice cream and olives, and you don't like to consume them together, you will spend all of your money on one or the other.

vi) Cobb-Douglas Preferences:



The optimal consumption position is where the indifference curve is tangent to the budget line.

⇉ Estimating Utility Functions:

{Book page 83}

⇉ Choosing Taxes:

Here is a nice example describing a choice between two types of taxes.

↳ A Quantity Tax is a tax on the amount consumed of a good, like a gasoline tax of 15 cents per gallon.

↳ An income tax is just a tax on income. If the government wants to raise a certain amount of revenue, is it better to raise it via a quantity tax or an income tax?

Let's apply what we have

learned to answer this question.

→ Suppose that the Original Budget Constraint is

$$p_1x_1 + p_2x_2 = m$$

i) What is the budget constraint if we tax the consumption of good 1 at a rate of t?

$$(p_1+t)x_1 + p_2x_2 = m$$

So, the optimal choice, (x_1^*, x_2^*)

The Revenue raised by this tax is $R^* = tx_1^*$

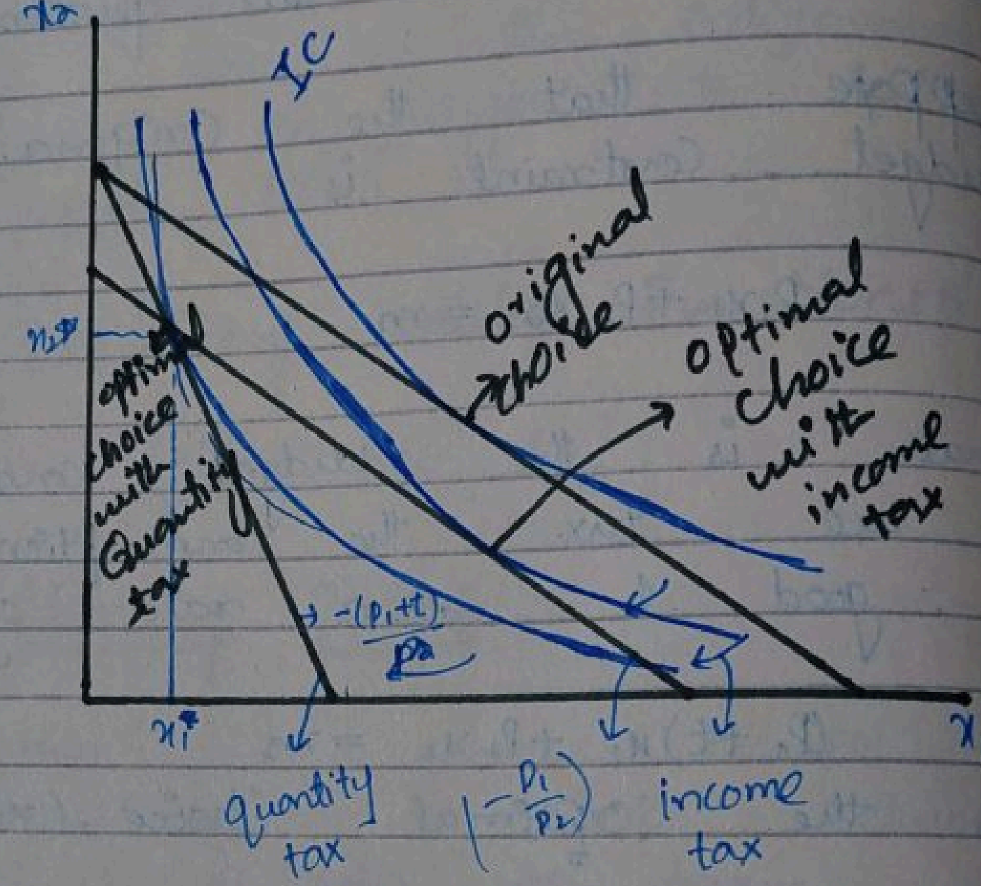
ii) Let's now consider an income tax that raises the same amount of Revenue. The form of this budget constraint would be.

$$p_1x_1^* + p_2x_2^* = m - R^*$$

or as we know $R^* = tx_1^*$ so,

$$p_1x_1^* + p_2x_2^* = m - tx_1^*$$

Graphically 8



→ Here we consider a quantity tax that raises a revenue R^* and an income tax that raises the same revenue. The consumer will be better off under the income tax, since he can choose a point on a higher indifference curve.

↳ Therefor the income tax is definitely superior to the quantity tax in the sense that you can raise the same amount

{Chapter # 05}

of Revenue from a consumer and still leave him or her better off under the income tax than under the Quantity tax.

Completed

Revised

{ Chapter # 04 }

Utility

→ Utility:

↳ Theory of consumer behavior has been reformulated entirely in terms of consumer preferences, and utility is seen only as a way to describe preferences.

↳ Mathematically, it is much easier to work with functions than with relations, such as the preference relation and the indifference relation.

↳ Our goal is to construct a function that will represent the preference of a consumer.

→ Utility Function

Utility function: An assignment of real numbers $u(x) \in R$ to each bundle x.

We say that u represents $\succ$ if the following holds.
$x \succ y$ if and only if $u(x) > u(y)$

An indifference curve is a set of bundles that give the same level of utility.

$$x \sim y \text{ if } u(x) = u(y)$$

Example 8

i) $x = (1, 6)$ and $y = (5, 9)$

If consumer: $y > x$, we need a function that gives us.

$$u(y) > u(x)$$

ii) For instance if I define the utility function as a multiplication of the units of x_1 and x_2 consumption.

$$U(y) = 5 \times 9 = 45$$
$$U(x) = 1 \times 6 = 6$$

$$45 > 6$$
$$u(y) > u(x)$$

Hence $u(u_1, u_2) = x_1 \cdot x_2$ is a good representation of consumer's preference

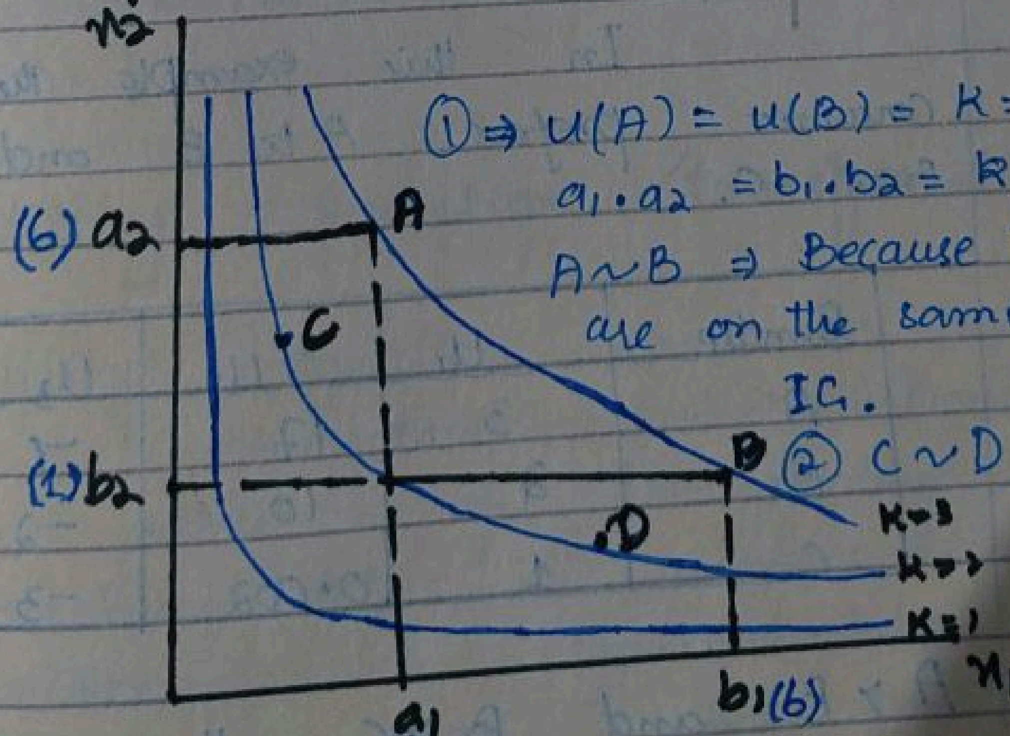
(ii) For instance instead of multiplying we are adding the units of x_1 and x_2 consumption.

$$(x_1, x_2) = x_1 + x_2$$
$$u(y) = (5+9) = 14$$
$$u(x) = 1+6 = 7$$

$$14 > 7$$
$$u(y) > u(x)$$

Hence $u(x_1, x_2) = x_1 + x_2$ is a good representation of consumption preference.

⇒ So, how to draw these utility functions?



① ⇒ $u(A) = u(B) = K = 3$
$a_1 \cdot a_2 = b_1 \cdot b_2 = K$
$A \sim B$ ⇒ Because they are on the same IC.

② $C \sim D$

⇒ $A \sim B > C \sim D$

⇒ Ordinal utility:

An ordinal utility function is a function representing the preferences of an agent on an ordinal scale. Ordinal utility theory claims that it is only meaningful to ask which option is better than the other, but it is meaningless to ask how much better it is or how good it is.

So only ordinal ranking matters while absolute levels does not matter.

Example:

In this example the consumer prefers A to B and B to C.

Bundle	U_1	U_2	U_3
A	3	17	-1
B	2	10	-2
C	1	0.002	-3

$A > B$ and $B > C$ then from

transitivity $A \succ C$ then

$A \succ B \succ C$

so $u(\cdot) \to$ any that satisfy.

$u(A) > u(B) > u(C)$ is fine

(Regardless of the absolute values)

i) Here in the table

$u_1(A) > u_1(B) > u_1(C)$

so $u_1(\cdot)$ is a good representation of $A \succ B \succ C$.

ii) $u_2(A) > u_2(B) > u_3(C)$

so u_2 is a good representation of $A > B > C$.

iii) $u_3(A) > u_3(B) > u_3(C)$

so u_3 is also a good representation of $A > B > C$.

Utility function transformations

Utility function can be transformed to monotone transformation:

a way of transforming one set of numbers into another set of numbers in a way that preserves the order of the number.

↳ For any increasing function $f: \mathbb{R} \to \mathbb{R}$, a utility function $V(x) \equiv f(u(x))$ represents the same preference as $u(x)$ since

$x \succ y$ if $u(x) > u(y)$

Similarly

$$V(x) = f(u(x)) > f(u(y)) = V(y)$$

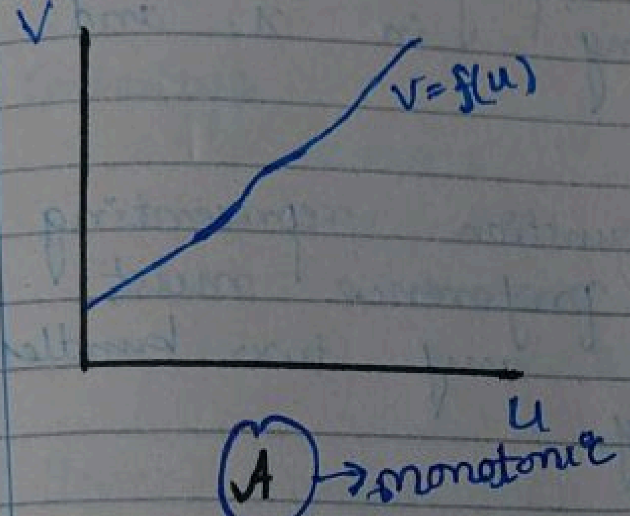
or $V(x) > V(y)$

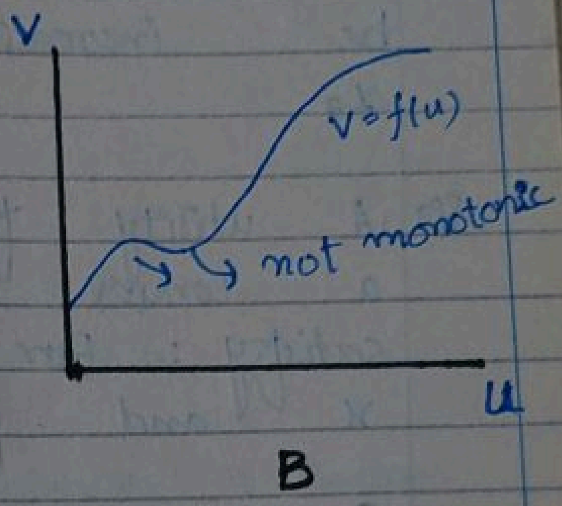
If consumer : $x \succ y$
then $u(x) > u(y)$

↳ An other function $V(\cdot)$ is a monotonic ~~fun~~ transformation of $u(\cdot)$ if and ~~ate~~ only if $V(x) > V(y)$ where $V(x) = f(u(x))$

Two consumers have the same preferences if their utility functions are monotonic transformation of an increasing

Graphically:





i) Panel (A) illustrates a monotonic function – one that is always increasing.

ii) Panel (B) illustrates a function that is not monotonic, since it sometimes increases and sometimes decreases.

So, in (A) V is a monotonic transformation of u if and only if V is always increasing with u.

→ Properties of utility function

i) A utility function representing a monotonic preference must be increasing in x_1 and x_2

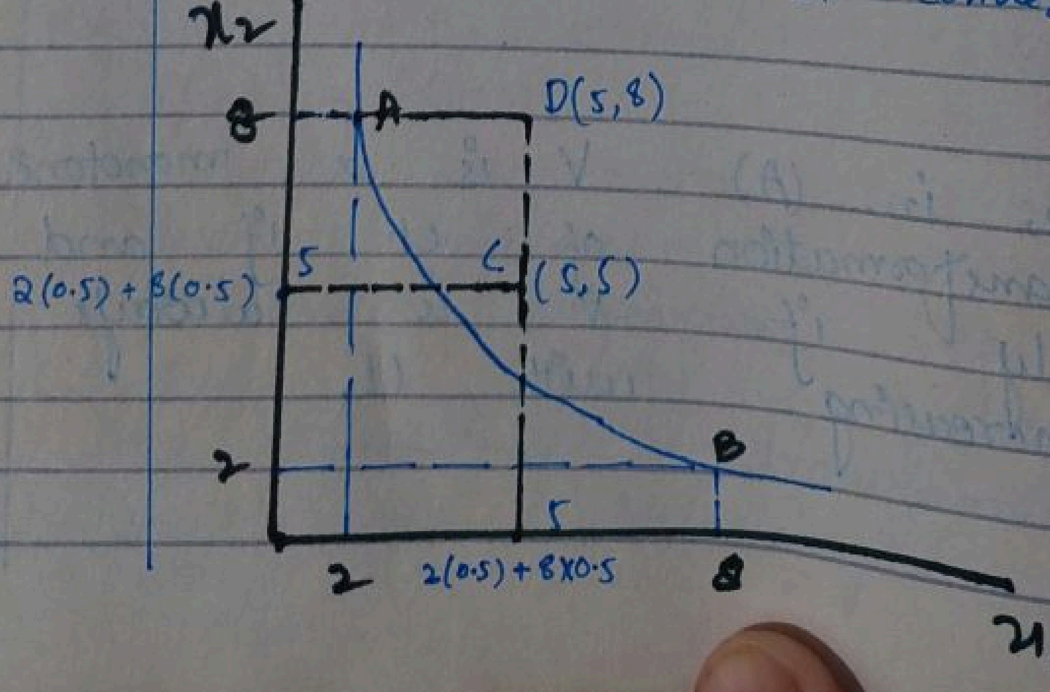
ii) A utility function representing a convex preference must satisfy : For any two bundles x and y.

Example :

Here the utility function $U(x_1, x_2)$ is given by $x_1 \cdot x_2$

means $U(x_1, x_2) = x_1 \cdot x_2$

So ~~lets~~ check this function is monotonic and convex.



→ Monotonocity :

$u(A) = 2 \times 8 = 16$ ↑ → increase in x_1 and x_2 u also increases

$x(D) = 5 \times 8 = 40$

↳ $u(x_1, x_2) = x_1 . x_2$ ⇒ monotonic

↳ Convexity :

$t = 0.5$

$u(C) = 5 \times 5 = 25$

$u(A) = 2 \times 8 = 16$

$u(B) = 2 \times 8 = 16$

Hence $u(x_1, x_2) = x_1 . x_2$ ⇒ Convex.

→ Examples of Utility function :-

All the examples satisfy the monotonicity and convexity which we described in the previous part. So all the examples represents well-behaved preferences.

i) Perfect substitutes.

B In the perfect substitutes the consumer only care about the total number of x_1 and x_2.

Thus it is the natural to measure utility by the total number of pencils.

$$\cancel{u(x)}\ u(x_1, x_2) = x_1 + x_2$$

2) One dollar \$ 5 dollar bills →

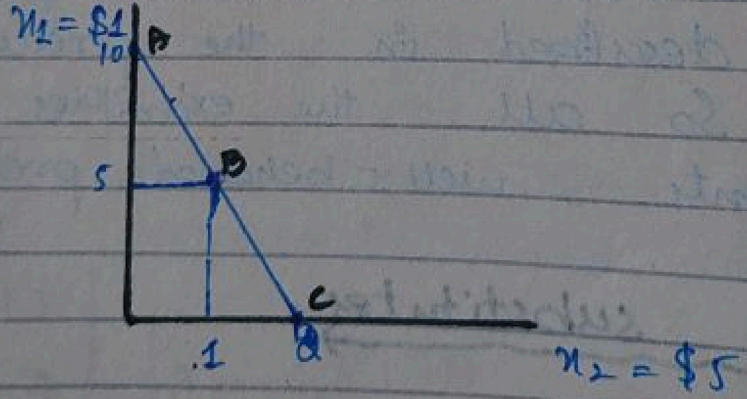
$$u(x) = x_1 + 5x_2.$$

This means that it is not reasonable for a consumer to have 1 dollar or 5 dollar bill because 5 units of x_2 are as valueable to 1 unit of x_1

Graphically:

$x_1 \Rightarrow \$1$

$x_2 \Rightarrow \$5$



A (10, 0) ⇒ \$10

B (5, 1) ⇒ $5 \times 1 + 1 * 5 = \$10$

C (0, 2) ⇒ \$10

3) In general, I can write any perfect subsitute as

$u(x) = ax_1 + bx_2$

And for perfect substitute I need to care about the substitution rate.

$u(\cancel{x_1, \Delta x_1})$ $\quad u(x_1 - \Delta x_1, x_2 + \Delta x_2) \Rightarrow$

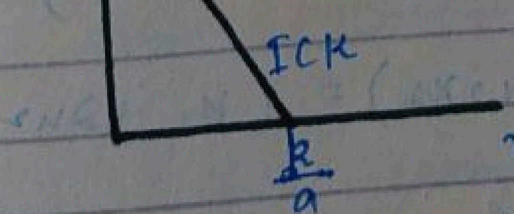
$u(x_1, x_2) \Rightarrow$

$$\frac{\Delta x_2}{\Delta x_1} = \frac{a}{b}$$

So, the substitution rate must be constant along the indifferece curves, so the slope must be constant.

$$\text{slope} = \frac{\Delta x_2}{\Delta x_1} = \frac{a}{b}$$ $\Rightarrow$ constant in case of perfect substitute.

So if the utility function is given by $u(x) = ax_1 + bx_2 = k$



The slope is constant for the perfect substitution

a) Perfect Compliment :

Left and Right shoes.

↳ $u(x) = \begin{cases} x_1 \text{ if } x_2 \geq x_1 \\ x_2 \text{ if } x_1 \geq x_2 \end{cases} = \min(x_1, x_2)$

x_1 = left
x_2 = Right
} consumer need to equal numbers of left shoes to have pair of shoes.

Right ≥ left.

$u(x) \begin{cases} \text{\# of left shoes if } x_2 \geq x_1 \\ \text{\# of Right shoes if } x_1 \geq x_2 \end{cases}$

$u(x) = \min(\text{\# left shoes}, \text{\# Right shoes})$

↳ if x_1 is a cup of tea and x_2 is a tea spoons of sugar then the utility function will b

(?) $u(x_1, x_2) = (x_1 + 2x_2)$

or $u(x_1, x_2) = (x_1 + 2x_2)$

In general, a utility function that describes perfect complement preferences is given by

$$u(x_1, x_2) = \underline{\min}(ax_1, ax_2)$$

minimum is that Point where here slope is not defined. where $ax_1 = bx_2$ and where a and b are positive numbers that indicate the proportions in which the goods are consumed.

3) Cobb-Douglas Preferences:

↳ (Perfectly smoothly convex preferences)

Another commonly used utility function is the Cobb-Douglas utility function

$$u(x_1, x_2) = x_1^c x_2^d, \quad c, d > 0$$

↳ Cobb-Douglas preferences are the standard example of indifference curves that look well-behaved

4 A monotonic transformation of the Cobb-Douglas utility function will represent exactly the same preferences, and it is useful to see a couple of examples of these transformation.

as $u(x_1, x_2) = x_1^c x_2^d$

1) First, if we take the natural log of utility.

$$u(x_1, x_2) = \ln(x_1, x_2) = cx_1\, dx_2$$

The logarithm is a monotonic transformation.

2) For the 2nd example, suppose that we start with the Cobb-Douglas form.

$$u(x_1, x_2) = x_1^c x_2^d.$$

Then rising utility to $\frac{1}{c+d}$ power, we have.

$$x_1^{\frac{c}{c+d}} \cdot x_2^{\frac{d}{c+d}}$$

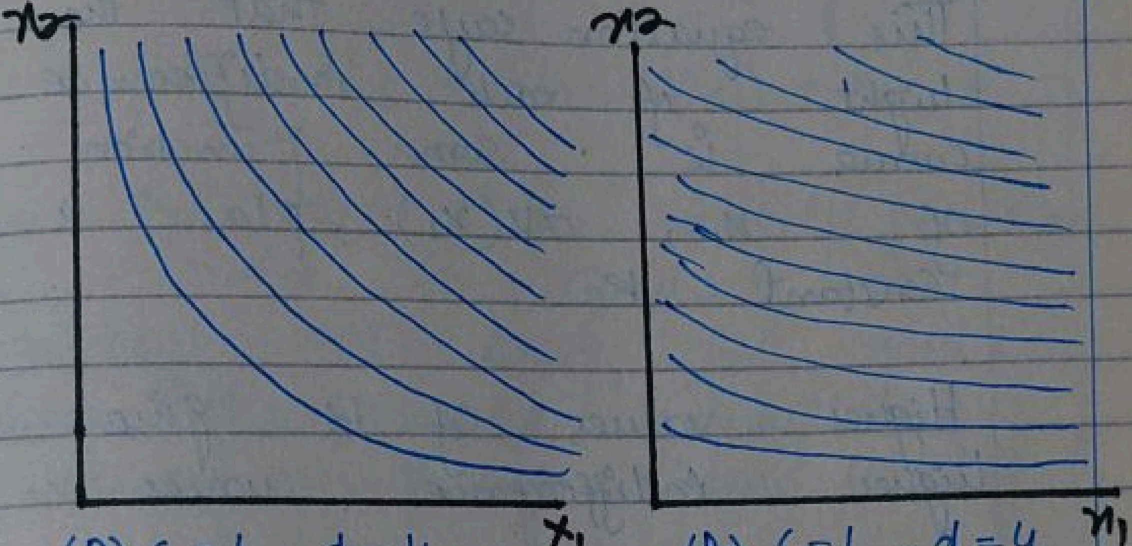
$$a = \frac{c}{c+d}, \text{ then } 1-a = \frac{d}{c+d}$$

So

$$u(x_1, x_2) = x_1^a x_2^{1-a}$$

This means that we can

always take a monotonic transformation of the Cobb-Douglas utility function that make the exponent sum to 1



(A) $c = \frac{1}{2}$, $d = 1/2$ (B) $c = \frac{1}{2}$, $d = \frac{4}{5}$

→ Panel (A) shows the case where $c = \frac{1}{2}$, $d = \frac{1}{2}$ and Panel (B) shows the case where $c = \frac{1}{2}$, $d = \frac{4}{5}$.

Note how different values of the parameter c and d leads to different shaps of the Indifference curves.

4) Quasilinear Preferences:

The equation for an indifference

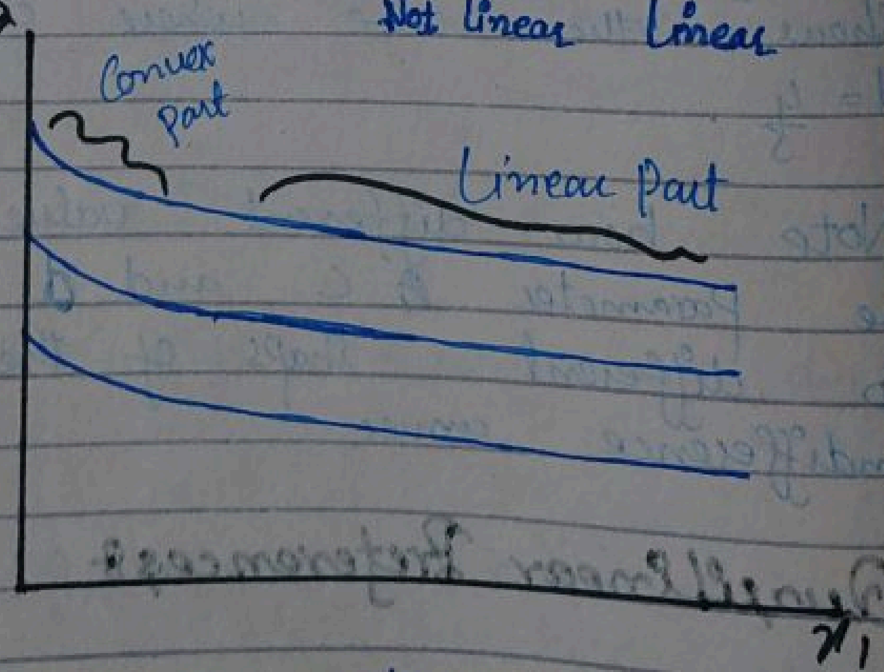
curve takes the form $x_2 = k - v(x_1)$, where k is a different constant for each indifference curve.

This equation says that the height of each indifference curve is some function of x_1, $-v(x_1)$, plus a constant k.

Higher values of k give higher indifference curves.

If $x_2 = k - v(x_1)$
$k = x_2 + v(x_1)$

so $u(x_1, x_2) = \underbrace{v(x_1)}_{\text{Not Linear}} + \underbrace{x_2}_{\text{Linear}}$



They are neither convex nor

linear that's why its called quasilinear preferences.

Solving for K and setting it equal to utility, we have.

$$u(x_1, x_2) = k = v(x_1) + x_2$$

In this case the utility function is linear in Good 2, but (possibly) not linear in good 1; hence the name Quasilinear meaning "partly linear" utility.

$$u(x_1, x_2) = R = \underbrace{v(x_1)}_{\text{not linear}} + \underbrace{x_2}_{\text{linear}}$$

Examples:

specific examples of Quasilinear utility would be

i) $u(x_1, x_2) = \sqrt{x_1} + x_2$

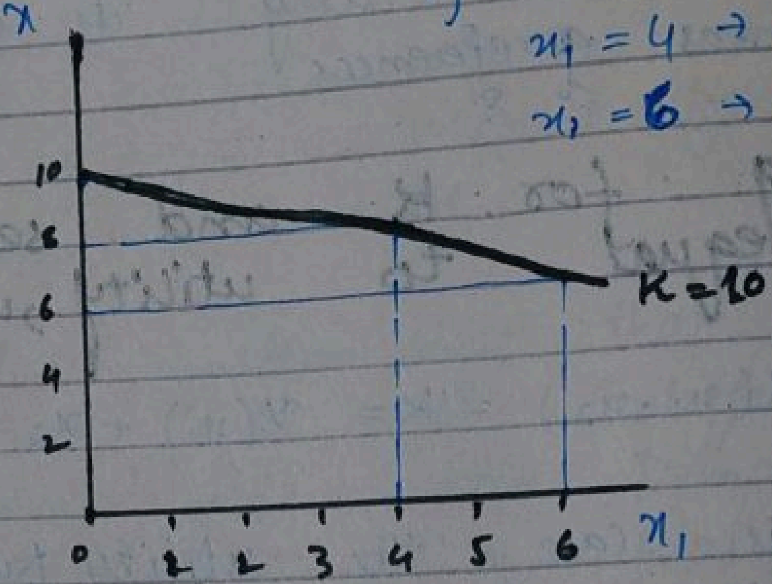
ii) $u(x_1, x_2) = \ln(x_1) + x_2$.

Ex: lets $u(x_1, x_2) = \sqrt{x_1} + x_2 = 10$ for $K = 10$

if $x_1 = 0 \rightarrow x_2 = 10$

$x_1 = 4 \rightarrow x_2 = 8$

$x_1 = 6 \rightarrow x_2 = 6$



The shape will be similar for the indifferce curves in Quasilinear preference what ever the numbers are.

⇒ **Marginal utility:**

Consider a consumer who is consuming some bundle of goods, (x_1, x_2). How does this consumer's utility change as we give him or her a little more of good 1? This rate of change is called the marginal utility with respect to good 1.

We write it as MU_1 and think of it as being a ratio,

$$MU_1 = \frac{\Delta u}{\Delta x_1} = \frac{u(x_1 + \Delta x_1, x_2) - u(x_1, x_2)}{\Delta x_2}$$

This measures the rate of change in utility (Δu) associated with a small change in the amount of Good 1 (Δx_1). Note that the amount of good 2 is held fixed in this calculations.

This definition implies that to calculate the change in utility associated with a small change in consumption of Good 1, we can just multiply the change in consumption by the marginal utility of the Good.

As we know that

$$MU_1 = \frac{\Delta u}{\Delta x_1}$$

So

$$\boxed{\Delta u = MU_1 \Delta x_1}$$

Similarly, with good 2.

$$MU_2 = \frac{\Delta u}{\Delta x_2} = \frac{(x_1, x_2 + \Delta x_2) - u(x_1, x_2)}{\Delta x_2}$$

Calculation of ΔU with a small change in Δx_2.

$$MU_2 = \frac{\Delta U}{\Delta x_2}$$

so

$$\Delta U = MU_2 \Delta x_2 .$$

→ Marginal Rate of Substitution and Marginal utility:

Marginal Rate of substitution measures the slope of the indifference curve at a given bundle of goods, it can be interpreted as the rate at which a consumer is just willing to substitute a small amount of good 2 for good 1.

Consider a change in the consumption of each good, $(\Delta x_1, \Delta x_2)$, that keeps the utility constant — that is, a change in consumption that moves us along the indifference curve then we must have

$MU_1 \Delta x_1 + MU_2 \Delta x_2 = \Delta U = 0.$

Solving for MRS,

$$MRS = \frac{\Delta x_2}{\Delta x_1} = -\frac{MU_1}{MU_2}$$

sign is negative because you give up x_2 to get x_1

$$MRS = -\frac{MU_1}{MU_2}$$

:- consumer's willingness to substitute.

Example:-

If the utility function is given by $x_1^a \cdot x_2^{1-a}$

if $MU_1 = a x_1^{a-1} \cdot x_2^{1-a}$.

$MU_2 = (1-a) x_1^a \cdot x_2^{1-a-1}$

What is the MRS.

so

$$MRS = -\frac{MU_1}{MU_2}$$

$$MRS = -\frac{a x_1^{a-1} \cdot x_2^{1-a}}{(1-a) x_1^a \cdot x_2^{\cancel{1}-a-\cancel{1}}}$$

{Chapter # 04}

$$= \frac{-a x_1^{a-1} \cdot x_2^{1-a}}{(1-a) x_1^{a} \cdot x_2^{a}}$$

$$MRS = -\frac{a \, x_2^{1-a+a}}{(1-a) x_1^{a-a+1}}$$

$$MRS = -\left(\frac{a}{1-a}\right)\left(\frac{x_2}{x_1}\right)$$

so

$$\boxed{MRS = -\frac{a}{1-a} \cdot \frac{x_2}{x_1}}$$

Completed

Revised

{Chapter No 6}

Demand

In This chapter we will examine how the demand for a good changes as price and income changes.

Studing how a choice responds to change in the economic Environment is called **Comparative statics**.

Comparative Statics is the comparison of two different economic outcomes, before and after a change in the economic environment.

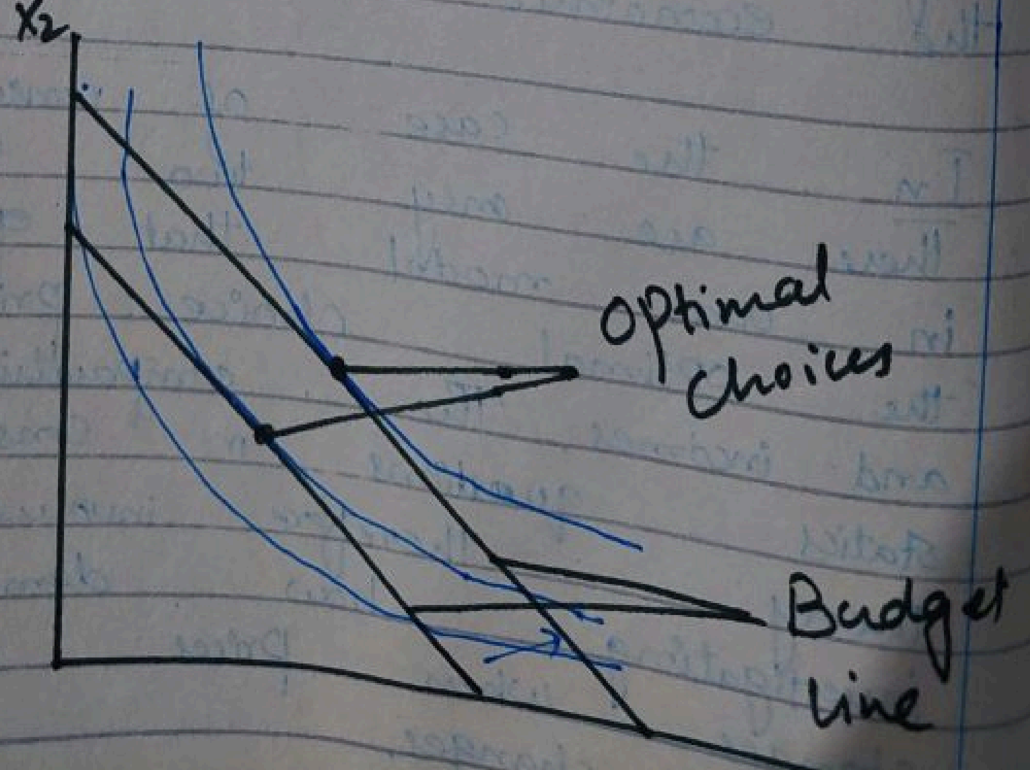
In the case of consumer, There are only two things in our model that effect the optimal choice: prices and incomes. The comparative statics questions in consumer theory therefore involve investigating how demand changes when prices and income changes.

→ Normal and Inferior Goods

i) A normal good is a type of Good which experiences an increase in demand due to an increase in income.

When there is an increase in a persons income, for example due to a wage rise, a good for which the demand rises due to the wage increases, is referred as a normal good.

Graphically

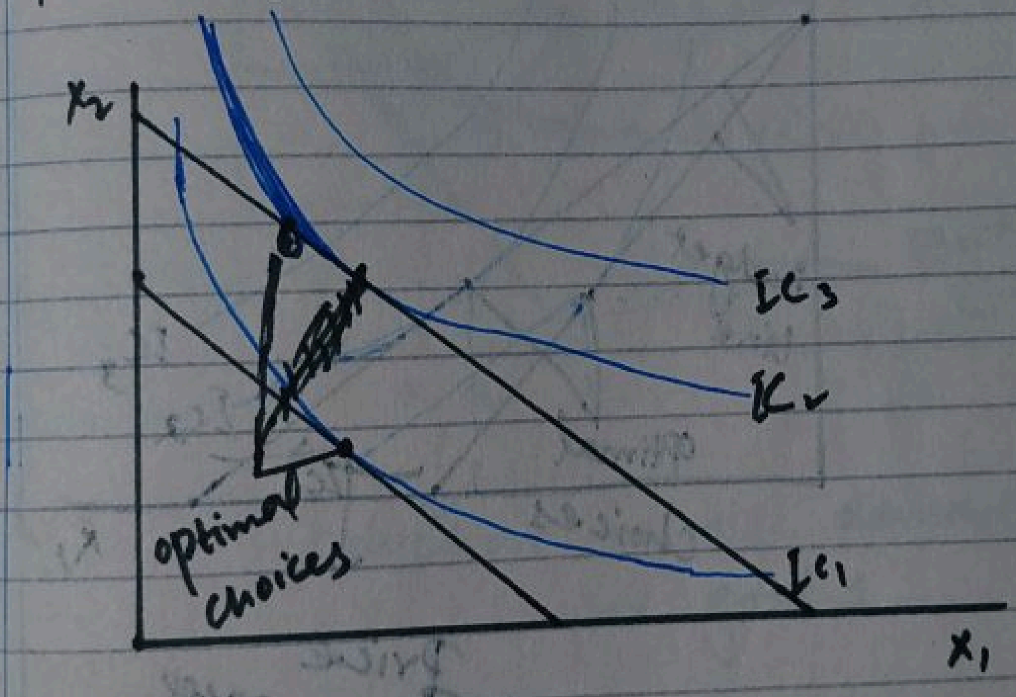


The demand for both goods increases when income increases, so both goods are nomal goods.

ii) Inferior Goods:

Inferior good is a good whose demand decreases when consumers income rises, unlike nomal goods.

Graphically:



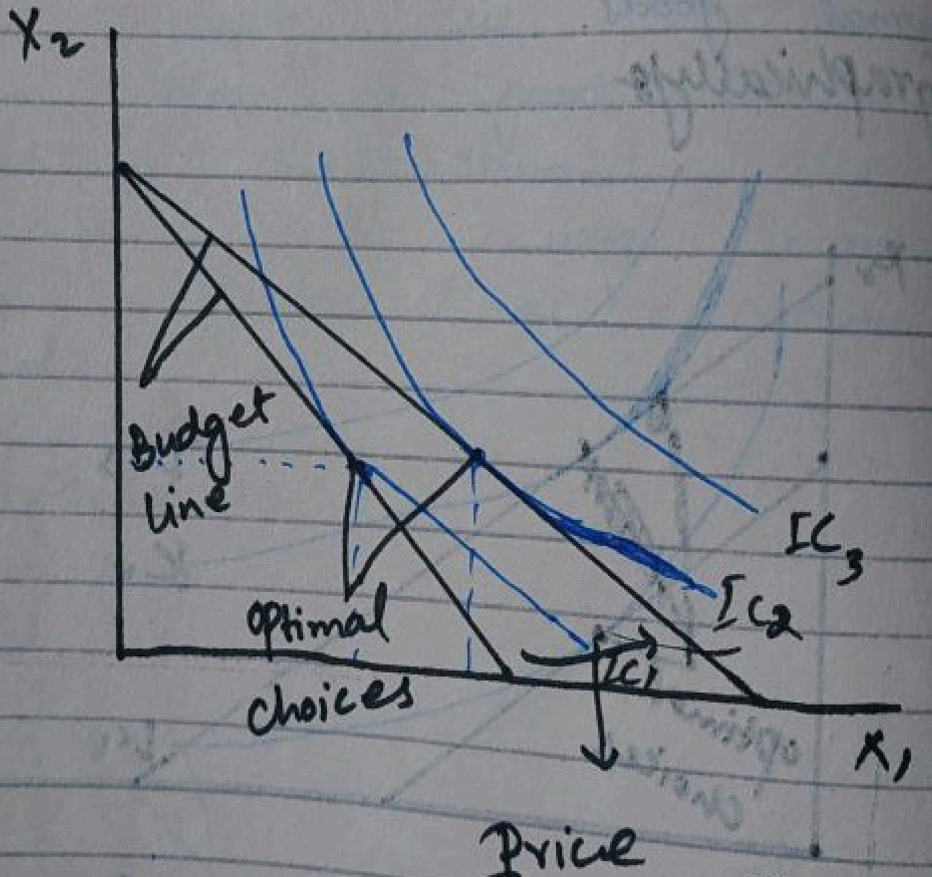
Good 1 is an Inferior Good, which means that the demand for it dereases when income increases.

→ Ordinary Goods & Giffen Goods

Ordinary goods are goods

that experiances an increase in quantity demanded when the price falls or conversely a decrease in quantity demanded when the prices rises.

→ Graphically:



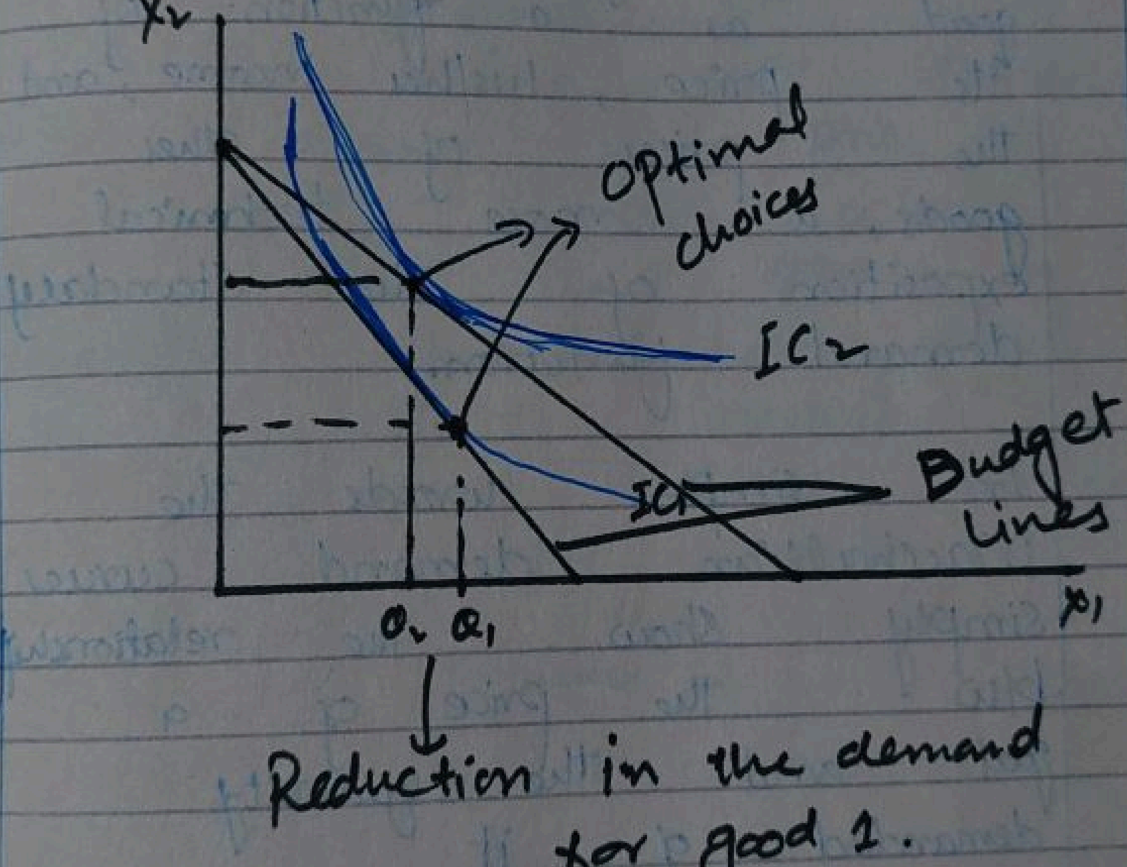
Ordinarily, the demand for a good increases when its price decreases, as in the case here.

→ Giffen Goods:

{Chapter # 06}

A Giffen good is a good whose demand decreases when its price decrease and demand increases when its price increases.

Graphically:



⇒ Completed
Revised

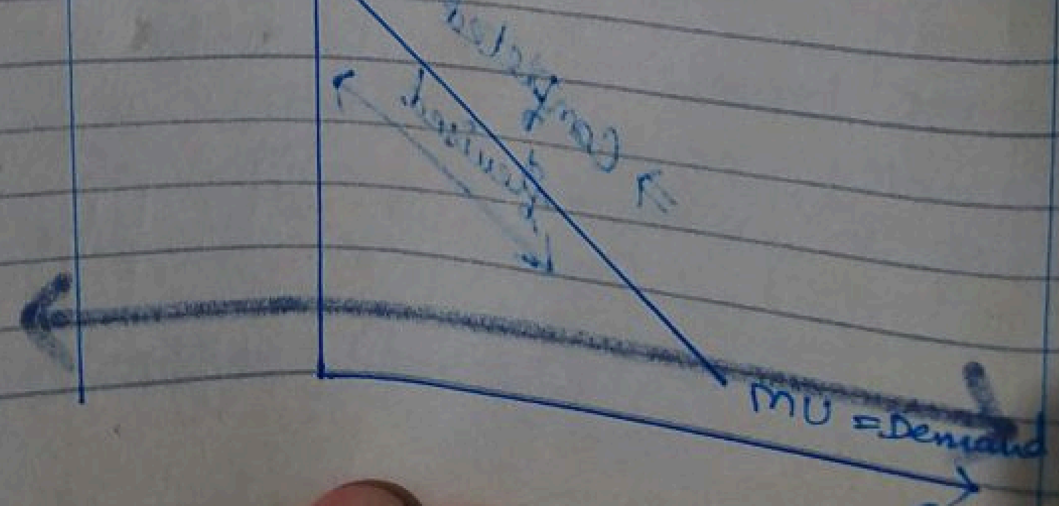
{Chapter No 8}

{Slutsky Equation}

i) ⇒ Marshallian Demand curve:

In microeconomics, a consumer's marshallian demand function is the quantity he/she demands of a particular good as a function of its price, his/her income, and the prices of other goods, a more technical exposition of the standard demand function.

In simple words the Marshallian demand curves simply show the relationship b/w the price of a good and the quantity demanded of it.



When the price of a good changes it will have 2 effects substitution & income effect. Now here we will calculate the SE and IE by 2 methods i) Putting utility constant (ii) Purchasing Power constant.

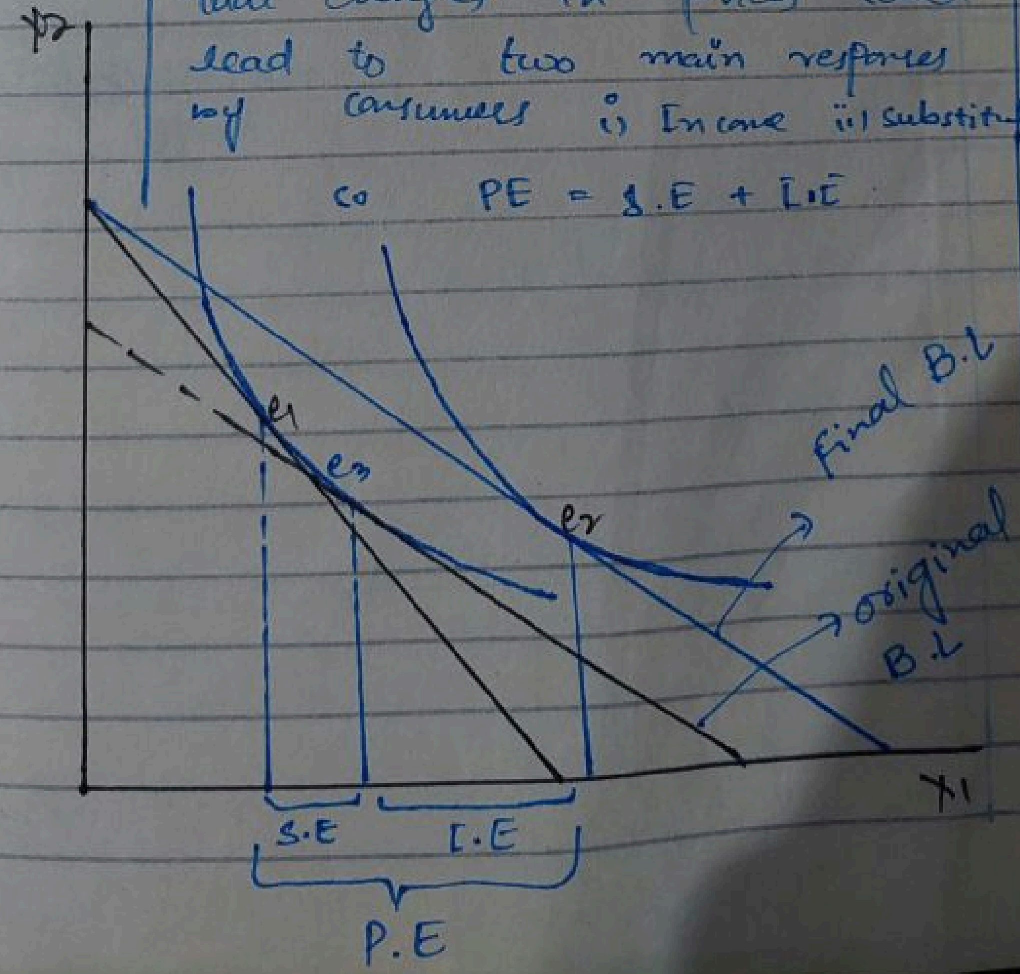
ii) ⇒ Hicksian Demand curve:

Hicksian demand curve show the relationship b/w the price of a good and the quantity demanded of it assuming that the prices of the other goods and our level of utility remain constant.

So here we will examine that when the price of a good changes what will be its effects on quantity demanded while putting the utility constant.

Economist had long understood that changes in prices could lead to two main responses by consumers i) Income ii) Substitution

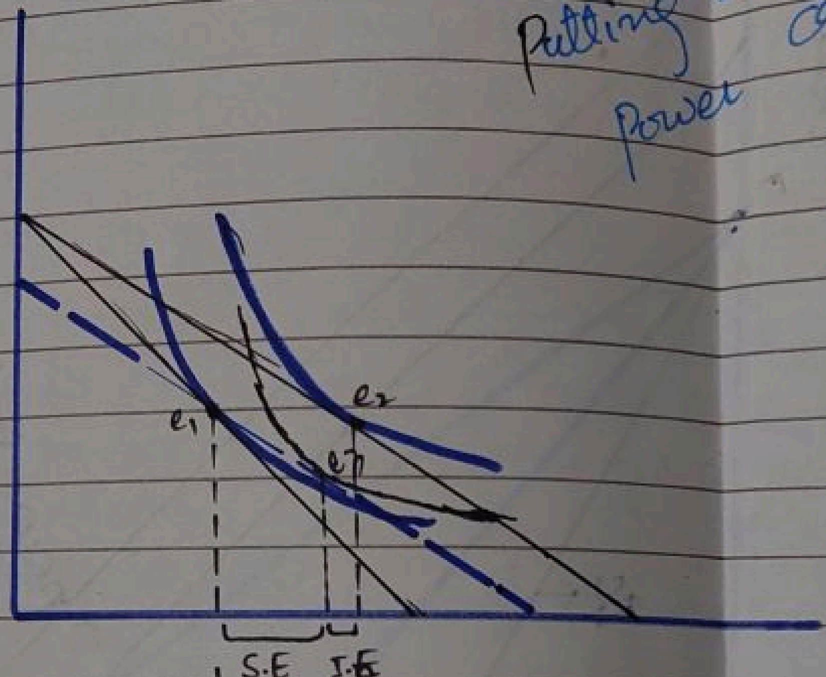
so PE = S.E + I.E



DATE ⇒ Slutsky Demand curves

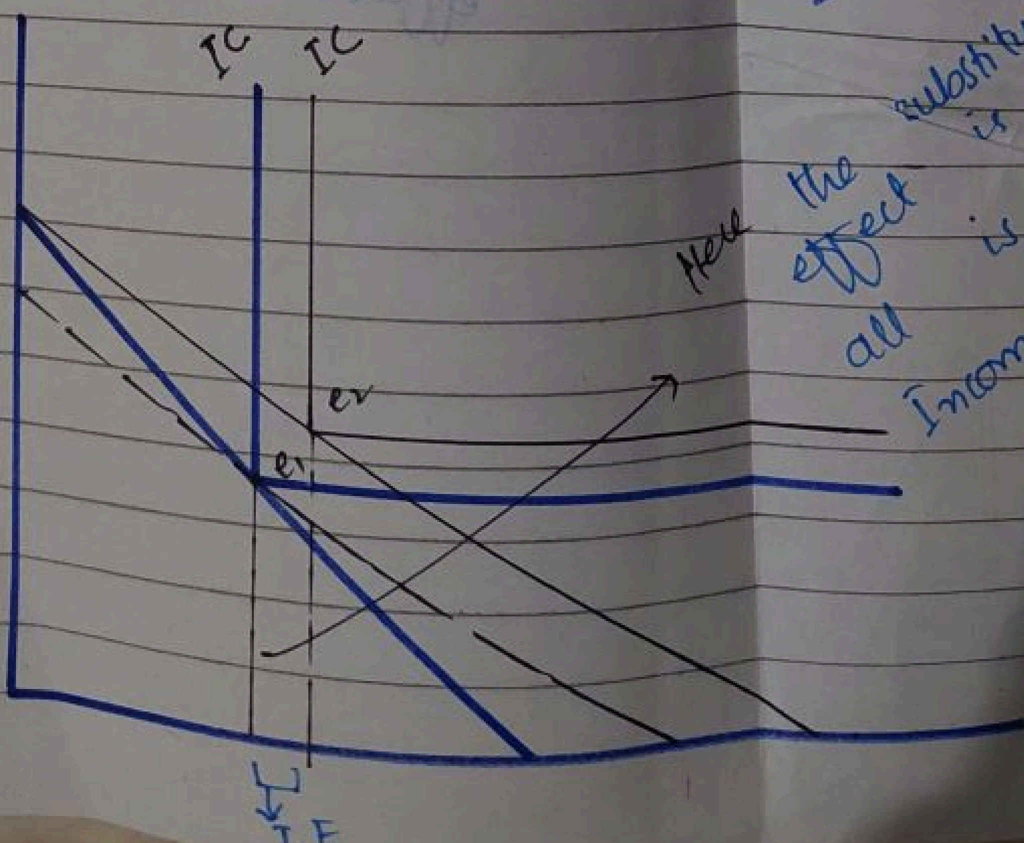
i) ~~Normal~~ ordinary Goods.

Putting the purchasing power constant.



Price effect.

ii) Perfect Compliments



Here the substitution effect is zero all is the Income effect

⇒ Slutsky Substitution effect:
The change in demand when the prices changes but a consumer's purchasing power is held constant so that the original bundle remains affordable.

⇒ Hicksian Substitution effect:
The change in demand when the prices change but a consumer's utility is held constant is called the hicksian substitution effect.

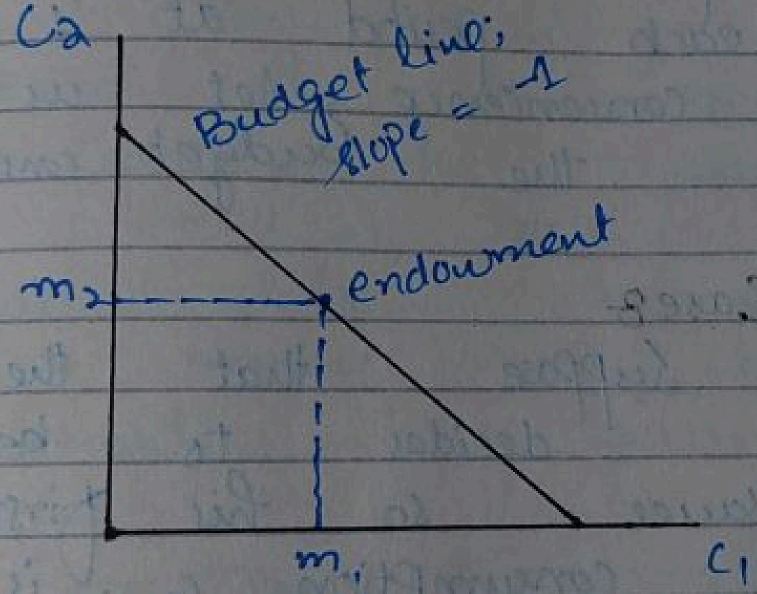
Chapter # 10

⇒ Intertemporal Choice

→ **Intertemporal Choice:**
Choices of consumption over time are known as intertemporal choices.

→ **The Budget Constraint:**
Let us imagine a consumer who chooses how much of some good to consume in each of two periods. We denote the amount of consumption in each period by (c_1, c_2) and suppose that the prices of consumption in each period are constant at 1. The amount of money the consumer will have in each period is denoted by (m_1, m_2)

Suppose initially that the only way the consumer has of transferring money from period 1 to period 2 is by saving it without earning interest. Furthermore let us assume for the moment that he has no possibility of borrowing money, so that the most he can spend in period 1 is m_1. His budget constraint will look like such as.



This is the budget constraint when the rate of interest is zero and no borrowing is allow; so there will be only two possible kind of choices.

i) The consumer just consumes his income each period.

ii) OR he can choose to consume less than his income during the first period to consume more in the second period.

Now, let us allow the consumer to borrow and lend money at some interest rate r. Keeping the prices of consumption in each period at 1 for convenience, let us derive the budget constraint.

1) **Saver Case:**

Suppose that the consumer decides to be a saver, so his first period consumption, c_1, is less than his first period income, $m_1 - c_1$, at the interest rate r. The amount that he can consume next period is given by.

$$C_2 = m_2 + (m_1 - C_1) + r(m_1 - C_1)$$

or

$$C_2 = m_2 + (1+r)(m_1 - C_1)$$

$$\boxed{C_2 + (1+r)C_1 = m_2 + (1+r)m_1}$$

$$P_1x_1 + P_2x_2 = P_1m_1 + P_2m_2$$

Future value

→ Borrower case 8

Now suppose that the consumer is a borrower so that his first period consumption is greater than his first-period income. The consumer is a borrower if $c_1 > m_1$, and the interest rate he has to pay in the 2nd period will be $r(c_1 - m_1)$. Of course, he also has to pay back the amount that he borrowed, $c_1 - m_1$. This means his budget constraint is given by.

$$c_2 = m_2 - r(c_1 - m_1) - (c_1 - m_1)$$

$$c_2 = m_2 + (1+r)(m_1 - c_1)$$

Which is just what we had before. if $m_1 - c_1$ is positive, then the consumer earns interest rate on his saving; if $m_1 - c_1$ is negative, then the consumer pays interest on his borrow-ing.

We can rearrange the budget constraint for the consumer to get two alternative forms that are useful:

$$(1+r)c_1 + c_2 = (1+r)m_1 + m_2$$

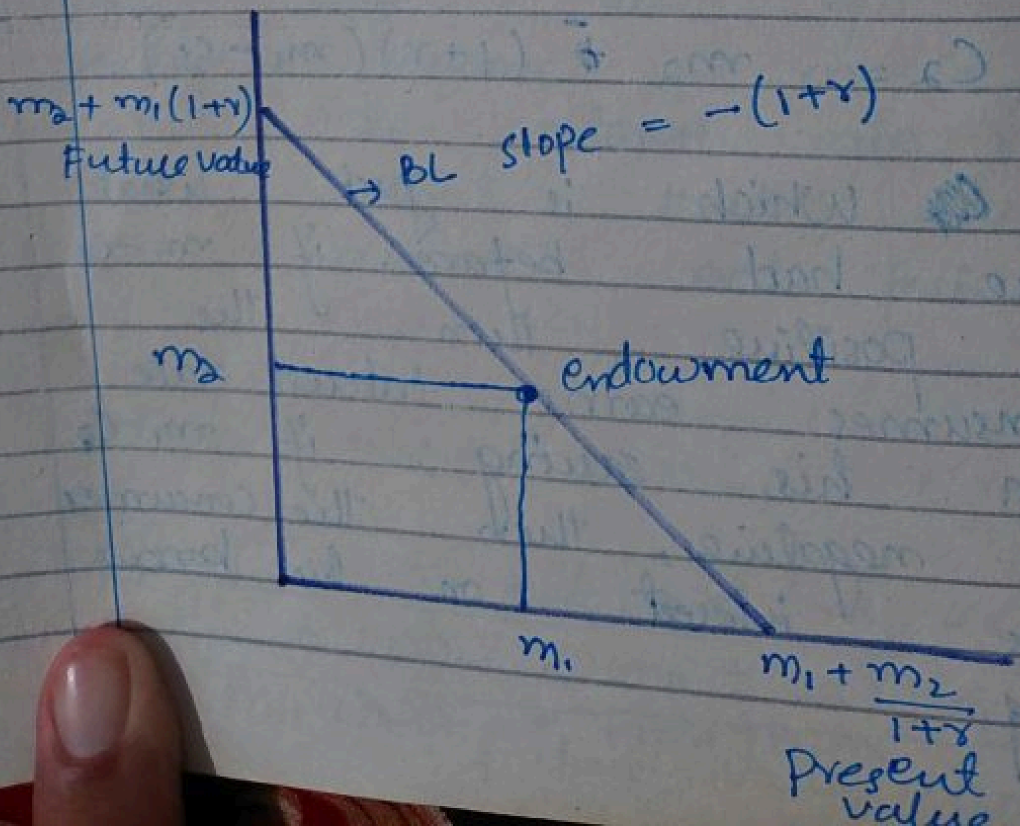
future value term.

If we devide $1-r$ on both sides we will get present value term.

$$c_1 + \frac{c_2}{1+r} = m_1 + \frac{m_2}{1+r}$$

$$P_1x_1 + P_2x_2 = P_1m_1 + P_2m_2$$

⇒ Budget Contraint with borrowing and lending will be such as in presente of Interest rate r.



the slope of the budget line here is $-(1+r)$ which can be drawn from both the present value term and Future value term such as.

As we know that

$$\frac{-P_1}{P_2} \Rightarrow \frac{-(1+r)}{1} \quad (FVT)$$

$$\frac{-P_1}{P_2} \Rightarrow \frac{-1}{1/(1+r)} \Rightarrow -(1+r) \quad (PVT)$$

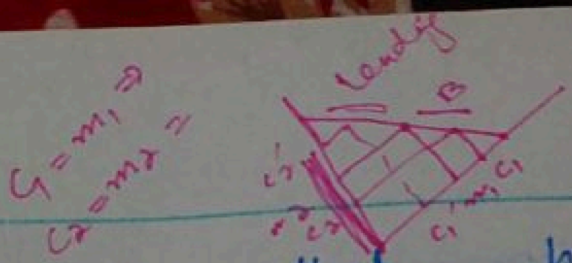
$\Rightarrow$ In FVT $P_1 = (1+r)$ and $P_2 = 1$

and in PVT $P_1 = 1$ and $P_2 = \left(\frac{1}{1+r}\right)$

$\Rightarrow$ Comparative statics:

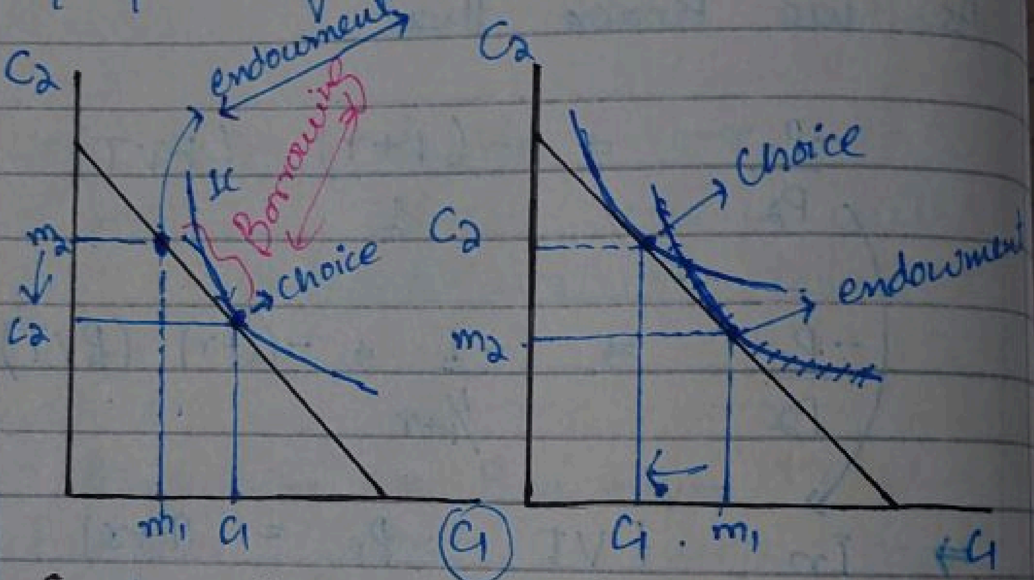
Given a consumer's budget constraint and his preferences for consumption in each of the two periods.

If a consumer chooses a point where $c_1 < m_1$, we



will say that he is a lender, and if $c_1 > m_1$, we say that he is a borrower.

⇒ Graphically:



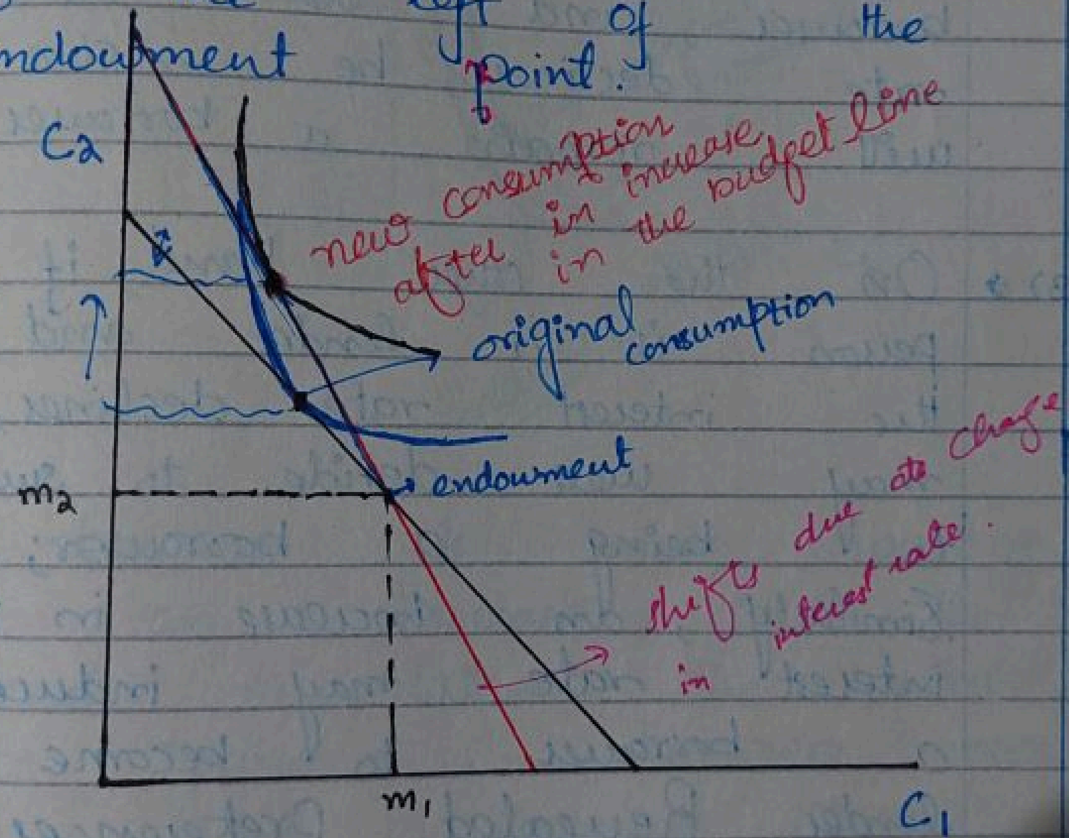
(Borrower) (Lender)

Panel A depicts a borrower, since $c_1 > m_1$, and panel B depicts a lender, since $c_1 < m_1$.

⇒ Let us now consider how the consumer would react to a change in the rate of Interest?

There are two cases, depending on wheather the consumer is initially a borrower or a lender.

Suppose first that he is a lender. Then it turns out that if the interest rate increases; the consumer must remain a lender. So, if the consumer is initially a lender, then his consumption bundle is to the left of the endowment point.

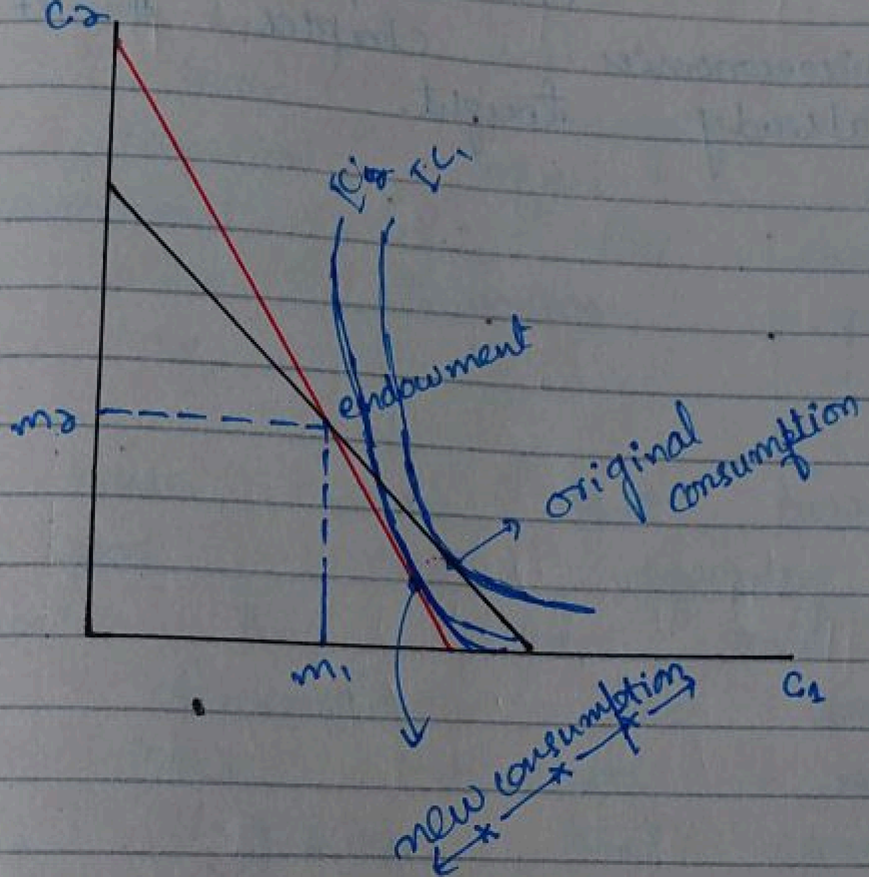


So, if a person is a lender and the interest rate rises, he or she will remain a lender. Increasing the interest rate pivots the budget line around the endowment to a steeper position; revealed preference implies that the new consumption bundle must lie to the left of the endowment.

2) → There is a similar effect for borrower: if the consumer is initially a borrower, and the interest rate declines, he or she will remain a borrower

3) → On the other hand, if a person is a lender and the interest rate declines, he may well decide to switch to being a borrower; Similarly, an increase in the interest rate may induce a borrower to become a lender. Revealed preferences tells us nothing about these last two cases.

→ If the consumer is initially a borrower, and the interest rate rises, but he decides to remain a borrower, then he must be worse off at the new interest rate.



A borrower is made worse off by an increase in the interest rate. When the interest rate facing a borrower increases and the consumer chooses to remain a borrower, he or she is certainly worse off.

{Completed}

Chapter # 14

⇒ Consumer Surplus & in principle of micuoeconomics chapter # 07 already tought.

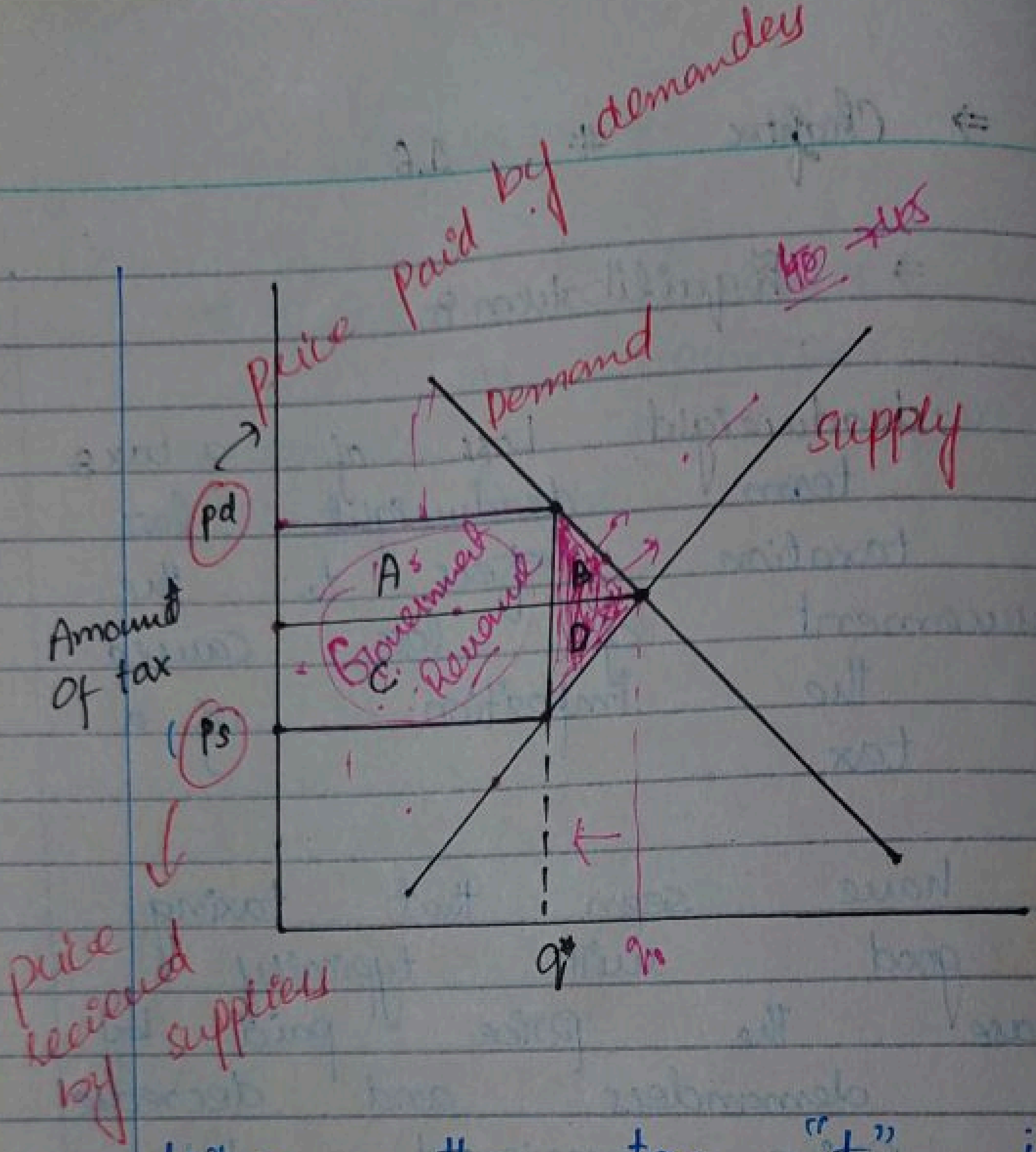
⇒ Chapter # 16

⇒ Equilibrium:

⇒ The deadweight Loss of a tax:
The term deadweight loss of taxation refers to the measurement of loss caused by the imposition of a new tax.

We have seen that taxing a good will typically increase the price paid by the demanders and decrease the price recieved by the suppliers, but from the economist's view point, the real cost of the tax is that the output has been reduced.
The lost output is the social cost of the tax. Let us explore the social cost of tax using the consumers and producers surplus tools.

⇒ Graphically:



When the tax "t" is imposed the output has been decreased by this tax, and we can use the falls of consumer and producer surplus to value the social loss. The loss in the consumer surplus is given by A+B and the loss in the producer surplus is given by C+D

Since we are after an expression for the social cost of the tax, it seems sensible to add the areas A+B and C+D to each other to get the total loss to the consumer and to the producers of the good in question. However, we are still left out one party – namely, the government.

The Government gains revenue from the tax. The net benefit to the government is the area A+C – the total revenue from the tax. Since the loss of producers and consumers surpluses are net costs, and the tax revenue to the government is a net benefit, the total net cost of the tax is the algebric sum of these areas: the loss in the consumer surplus, –(A+B), the loss in the producer surplus, –(C+D), and the revenue gain in government +(A+C). The net result

is the area $-(B+D)$.
This area is known as the deadweight loss of the tax or the excess burden of the tax.

(Completed)

Chapter # 19
Profit Maximization

→ **Profit :-**

"A firm exists to produce goods and services for a market; therefor, firm's preferences over production plans will have to depend on market conditions in two types of market it participates in: input market & output market.

Suppose that the firm produces n outputs $(y_1, --- y_n)$ and uses m inputs $(x_1, --- x_m)$

Let the prices of the output good be $(P_1, -P_n)$ and the prices of the inputs be $(w_1, --- w_m)$

⇒ Profit are defined as revenues minus cost.

The profits the firm recieves, π, can be expressed as.

$$\pi = \sum_{i=1}^{n} p_i y_i - \sum_{i=1}^{m} w_i x_i$$

→ cost of the inputs.

revenue collected after selling output

$$\pi = \overbrace{(P_1 y_1 + P_2 y_2 + \cdots P_n y_n)}^{\text{Total Revenue}} - \underbrace{(w_1 x_1 + w_2 x_2 + \cdots w_m x_m)}_{\text{Total Cost.}}$$

This leads to

$$\pi = \sum_{i=1}^{n} p_i y_1 - \sum_{i=1}^{m} w_i x_i$$

⇒ **If I have 2 inputs and 1 output model then i will have**

$$\begin{array}{ccc} x_1 & x_2 & y \\ \downarrow & \downarrow & \downarrow \\ w_1 & w_2 & p \end{array}$$

prices ← w_1

profit ← $\pi = \underbrace{Py}_{\text{output}} - \underbrace{(w_1 x_1 - w_2 x_2)}_{\text{inputs}}$

⇒ **Fixed and variable factors**

↳ We refer to a factor of production that is in a fixed amount for the firm as a fixed factor.

4) If a variable can be used in different amounts, we refer to it as a variable factor.

• There is no rigid boundary between the short run and a long run.
The important thing is that some of the factors of production are fixed in the short run and variable in the long run.

Note :- In long Run there is no fixed ~~variable~~ factor so all the factors are variable.

5) Since all the factors are variable in the long-Run, a firm is always free to decide to use zero inputs and produce zero output - that is, to go out of the business.
Thus the least profits a firm can make in

in the long run are zero profit.

In the L.R : If $\pi < 0$: firm go out of business.

ii) → In the short run, the firm is Obligated to employ some factors, even if it decides to produce zero output.

Therefor it is perfectly possible that the firm could make negative profits in the short run.

In SR : if $\pi < 0$ firm can wait in L.R that the prices may continue to rise so they continue to produce output.

i) → Short Run Profit Maximi-zation &

Let's consider the short-run profit maximization problem when input 2 is fixed at some level $\bar{x}_2$.

Let $f(x_1, x_2)$ be the production function for the firm, let p be the price of output, and let w_1 and w_2 be the prices of two inputs.

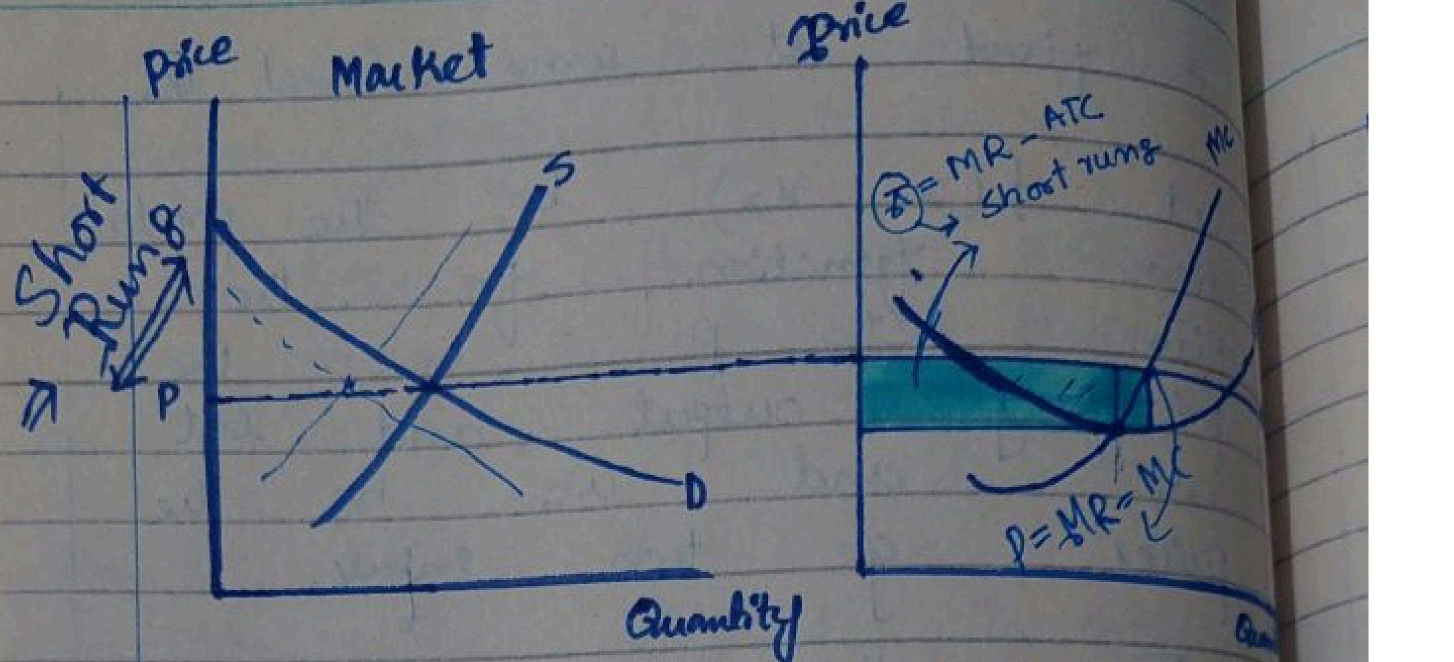
Then the profit maximization problem facing the firm can be written as.

$$\max_{x_1} \underbrace{Pf(x_1, \bar{x}_2)}_{\text{output / revenue.}} - \underbrace{w_1x_1 - w_2x_2}_{\text{inputs / costs}}$$

This means that the firm can get a higher level of profit/output by adjustment in the x_1 because $\bar{x}_2$ is fixed and cannot be changed to get a higher level of profit/output

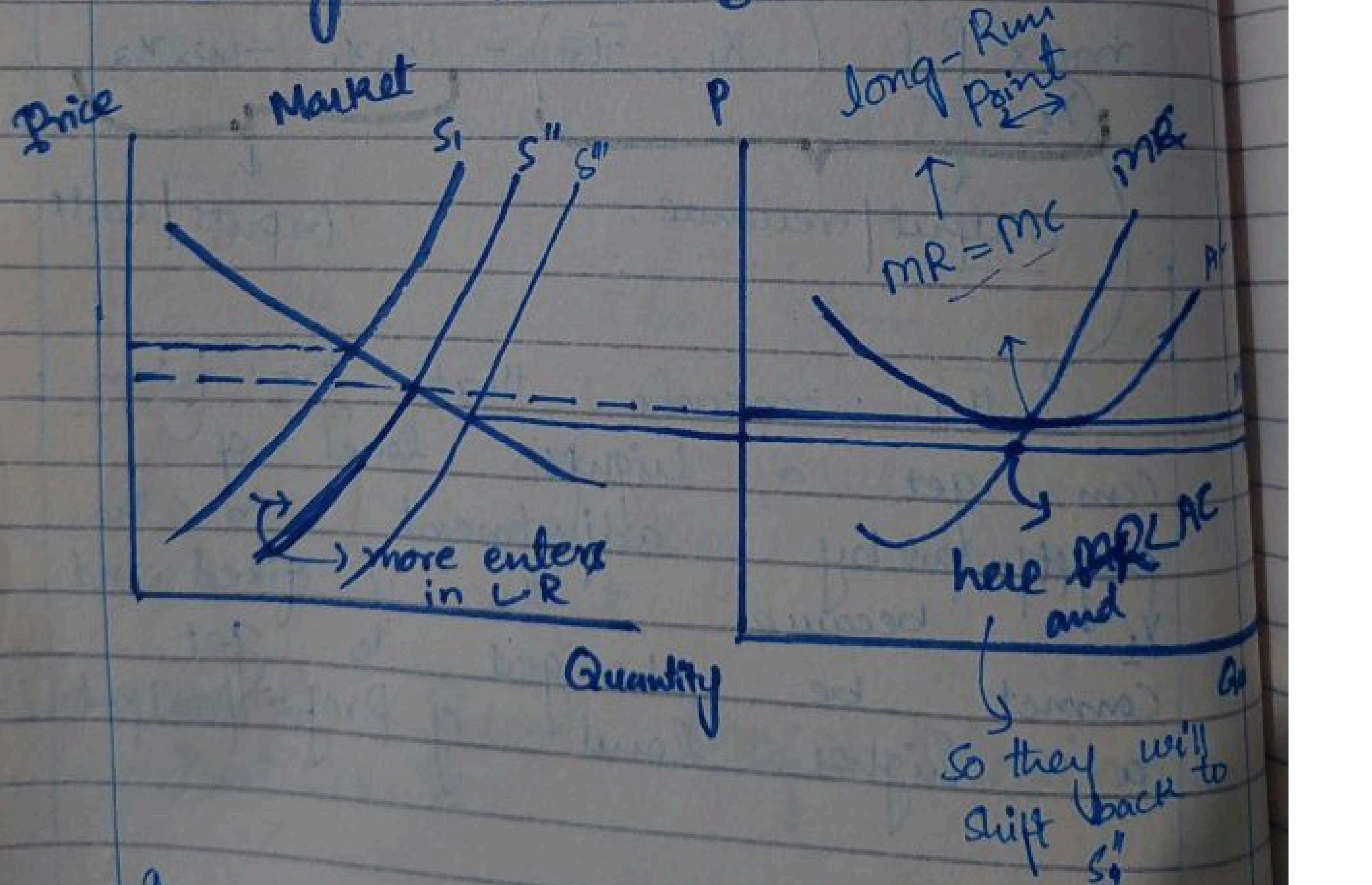
⇒ Graphically :

⇒ It is important :



⇒ In perfect competitions

⇒ Long - Run :



In order to maximize profits in the competitive market, firms set marginal revenue equal to marginal cost (MR = MC). MR is the slope of the revenue curve, which is also equal to the demand curve (D) and (P)

⇒ (Completed)

Chapter # 20

⇒ Cost Minimization :

Suppose that we have 2 factors of production x_1, x_2 and prices ω_1 and ω_2. and that we want to figure out the cheapest way to produce a given level of output, y.

↳ If we let x_1 and x_2 measure the amounts used of the two factors and let $f(x_1, x_2)$ be the production function for the firm, we can write this problem as

$$\min_{x_1, x_2} \omega_1 x_1 + \omega_2 x_2$$

Such that

$$f(x_1, x_2) = y$$

The firms have two objectives

i) Profit maximization

$$\pi = P.y - \omega_1 x_1 - \omega_2 x_2$$

ii) Cost minimization

$$C = \omega_1 x_1 - \omega_2 x_2$$

The solution to this cost minimization problem – the minimum cost necessary to achieve the desired level of output – will depend on w_1, w_2 and y, so we write it as $c(w_1, w_2, y)$

This function is also known as cost function.

Suppose that we want to plot all the combinations of inputs that have some given level of cost, C.
We can write this as
$$w_1 x_1 + w_2 x_2 = C \Rightarrow \textbf{Isocost curve}$$

Which can be rearranged to give

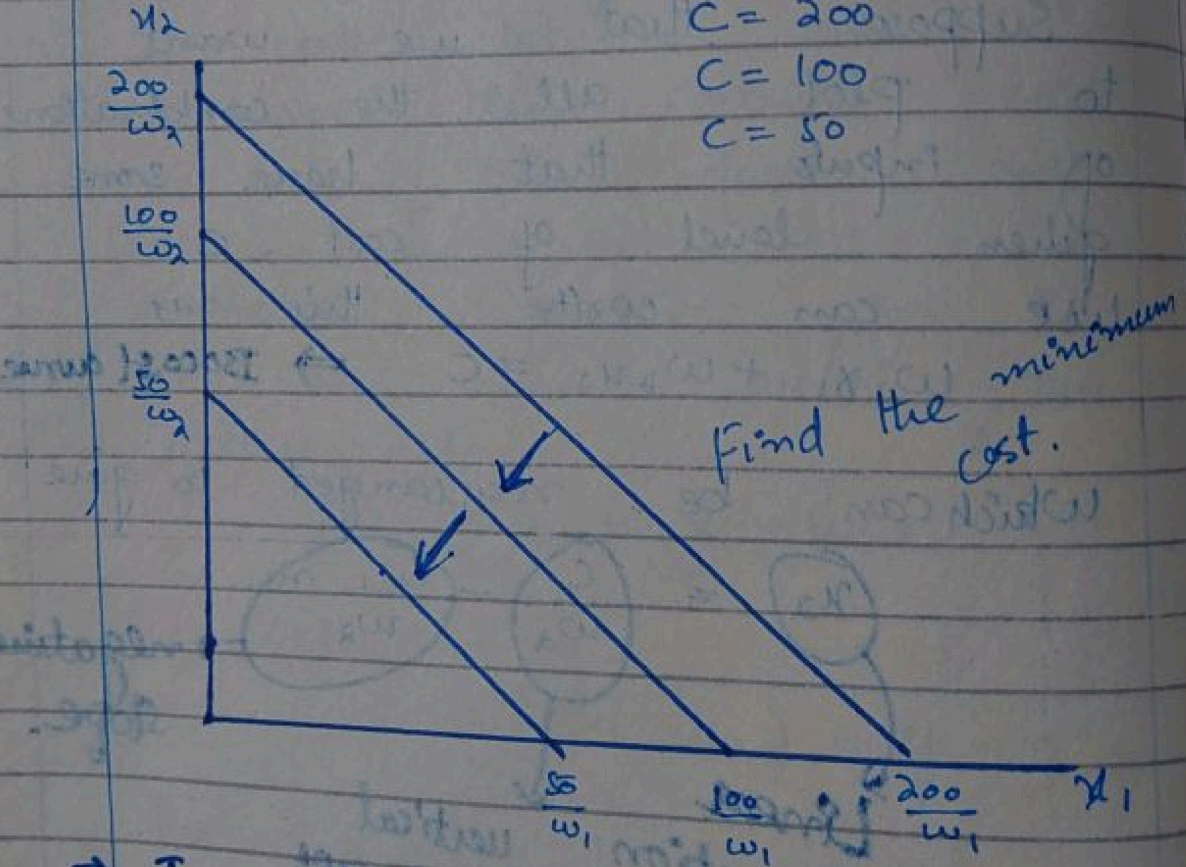
$$x_2 = \frac{C}{w_2} - \frac{w_1}{w_2} x_1$$

x_2 → **Linear Function**
$\frac{C}{w_2}$ → **vertical intercept**
$\frac{w_1}{w_2}$ → **negative slope.**

This is a straight line of slope $-\frac{w_1}{w_2}$ and because a vertical intercept of $\frac{C}{w_2}$

As we let the number C vary we get a whole family of isocost lines

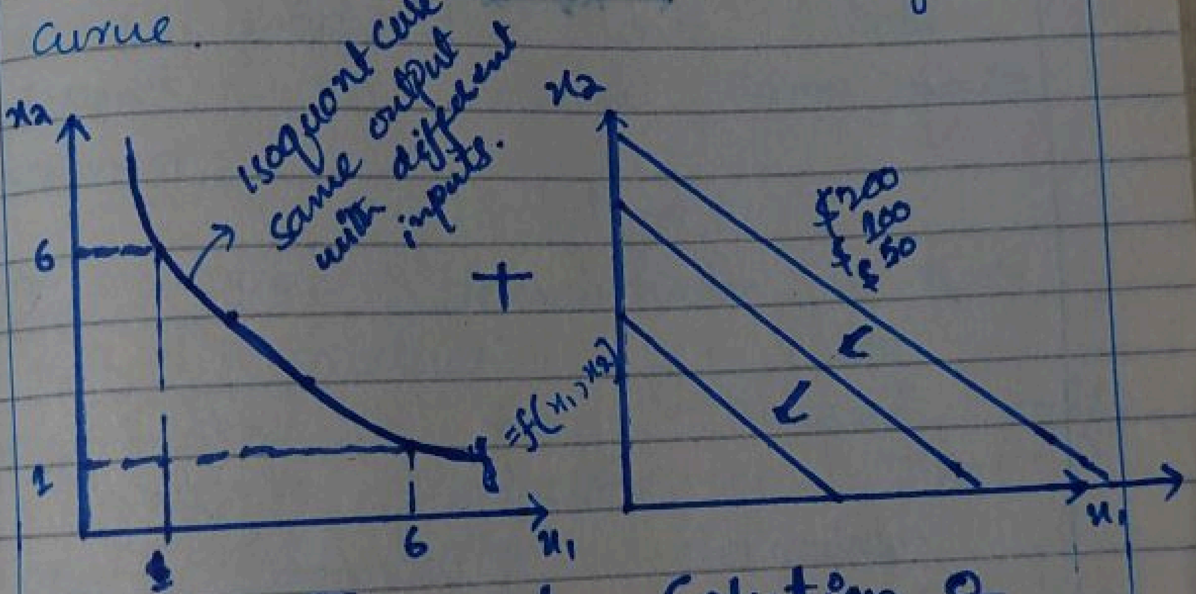
Every point on the isocost curve has the same cost, C and higher isocost lines are associated with higher ~~lines~~. costs



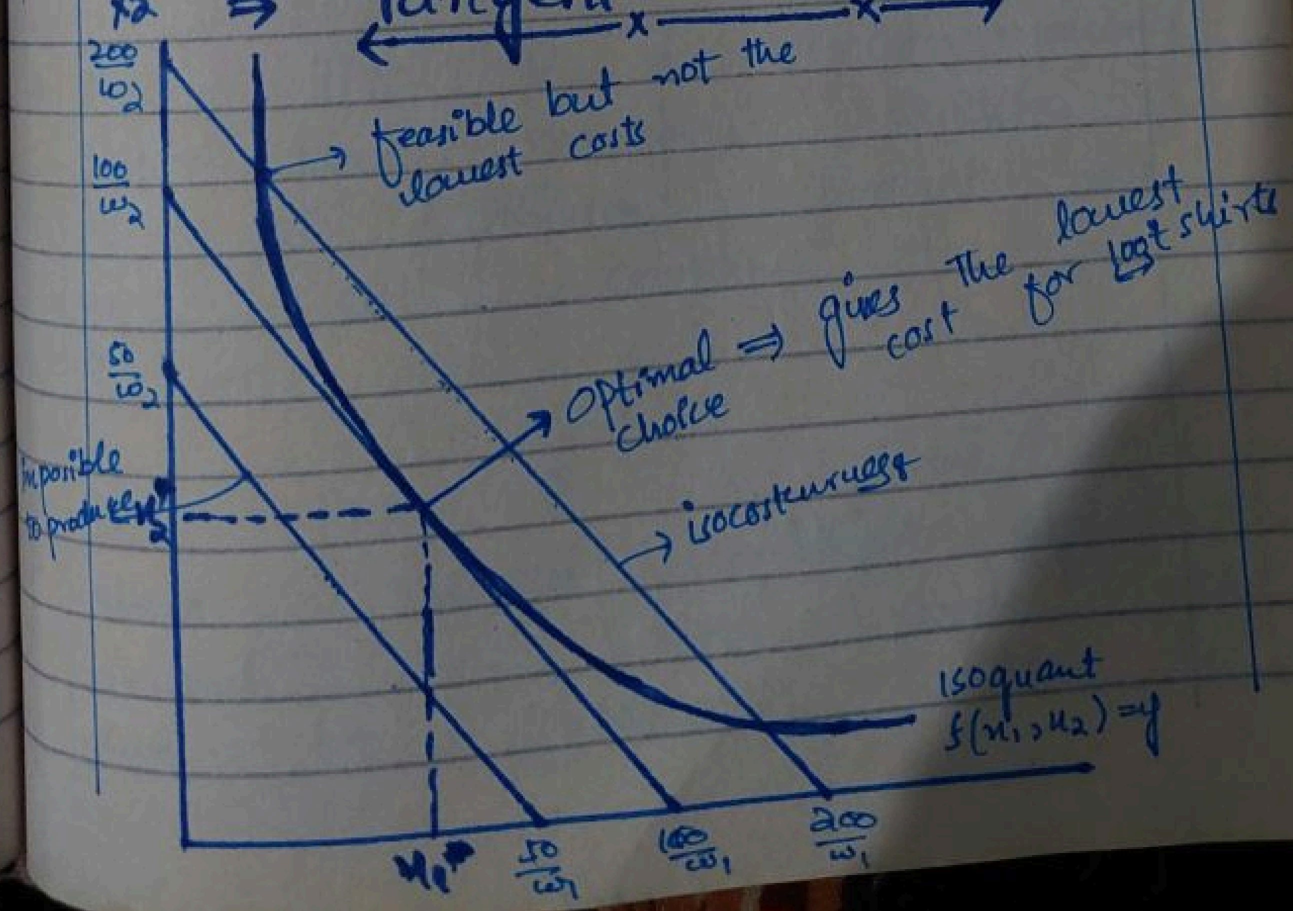
→ **Tangent Solutions**

Our cost minimization problem can be rephrased as: find the point on the isoquant that has the lowest possible isocost line associated with it.

Consider iso-cost line for each cost level : C, $w_1x_1 + w_2x_2 = C$; find the lowest isocost line that meets the isoquant curve.



⇒ **Tangent Solution :**



The choice of factors that minimize production costs can be determined by finding the point on the isoquant that has the lowest associated isocost curve.

⇒ **Completed** :

(Chapter # 32)

(Production)

→ **Production Possibility Frontier:**
The production possibility frontier/curve illustrating the varing ~~product~~ amounts of two products that can be produced when both depend on the same finite resources.

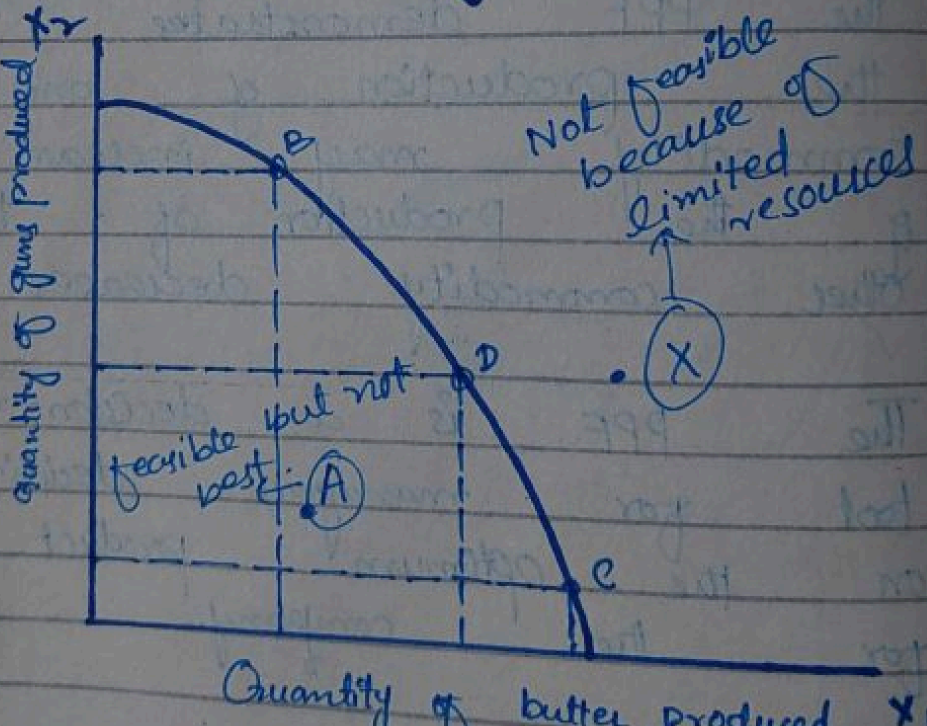
→ The PPF demonstrates that the production of one commodity may increase only if the production of the other commodity decreases

→ The PPF is a decision-making tool for managers, deciding on the optimum product mix for the company.

⇒ The PPF is a curve which shows various combinations of the amounts of two goods which can be produced within the given resources and technology

This tradeoff is usually considered for an economy, but also applies to each individuals, households, and economic organizations. One good can only be produced by diverting resources from other goods, and so by producing less of them.

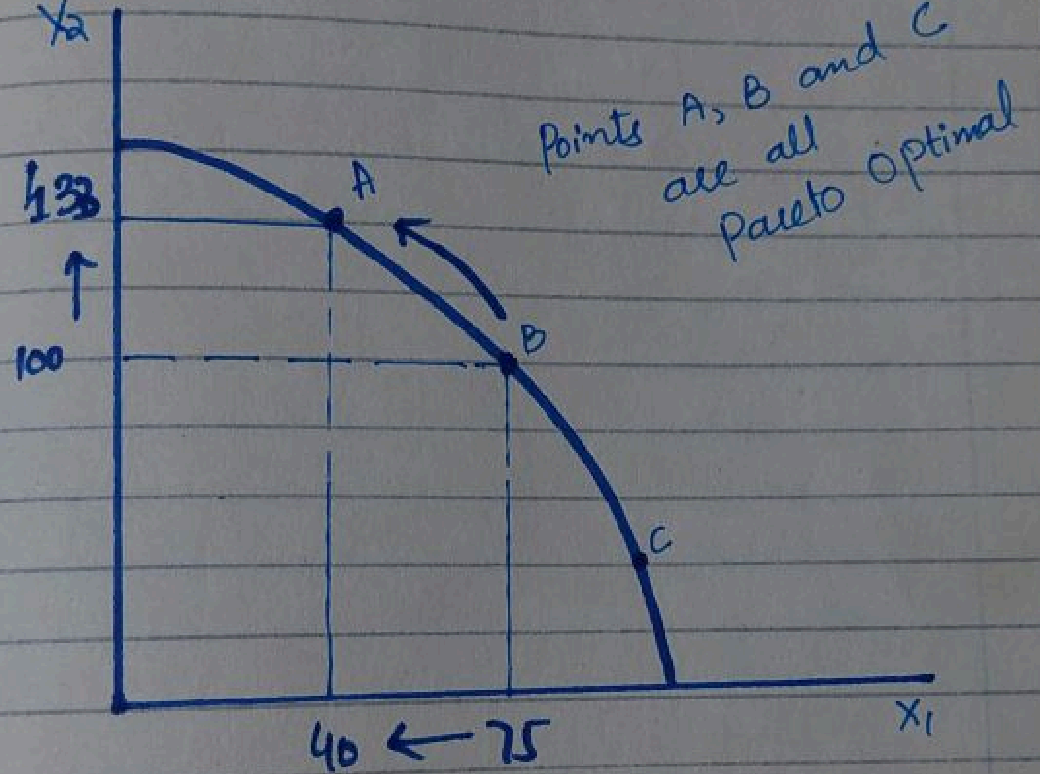
⇒ **Graphically:**



→ **Pareto Optimality:**

Pareto Optimality is the state

at which resources in a given system are optimized in a way that one dimension cannot improve without a second worsening.



Here if we want to increase some amount of x_2 so we have to give up the amount of x_1 to achieve the optimal point A, we do this because the resources are limited.

→ Completed

cost curves can be used to depict graphically the cost function of a firm.

Chapter # 21

Cost curves

What we will cover today:-

↳ Here we will provide a way to think about the costs graphically.

↳ We will break down total costs into constituent parts of fixed and variable costs.

↳ We will examine graphs and characteristics of these cost curves.

→ Average costs:-

↳ The average variable cost function measures the variable costs per unit of output

i.e. $\frac{c_v(y)}{y} \rightarrow \frac{\text{Variable cost}}{\text{output}}$

↳ The average fixed cost function measures the fixed cost per unit of output.

i.e $\frac{F}{y} \rightarrow \frac{\text{Fixed cost}}{\text{output}}$.

↳ Together these gives us

AFC are the costs of the firm that must be paid regardless of what level of output the firm produces e.g.:- Mortgage payment

the average cost function measures the cost per unit of output.

$$AC(Y) = \frac{C(Y)}{Y} + \frac{F}{Y} = AVC(Y) + AFC(Y)$$

Here we can see that in both nominator and denominator in the function of variable cost there is output Y. such as.

$\frac{C(Y)}{Y}$, So when output rises the variable cost could rises or vice versa

and when the ~~average~~ out-put rises the average fixed cost could fall.

$\Rightarrow \frac{C(Y) \uparrow}{Y \uparrow}$ when output rises. , $\frac{F \downarrow}{Y \uparrow}$ → when output rises.

Difference b/w AC and AVC :

The difference between the average cost and the average variable cost is just average fixed cost, so if AFC = 0 then AC = AVC.

⇒ The average fixed costs decreases as output is increased (it looks like the left half of a U)

⇒ The average variable costs increases when output increases (it looks) like the right half of a U)

⇒ Average total cost curve is the combination of the two effects, a U shaped curve.

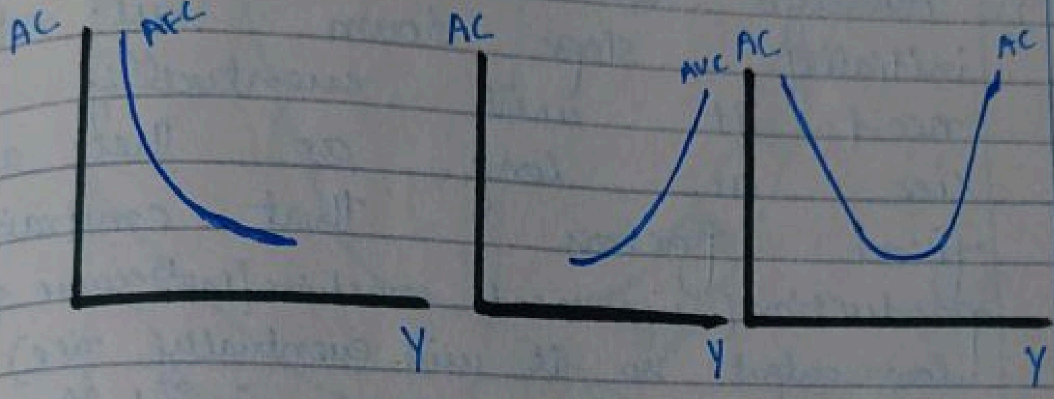
→ **Graphically:**
What do these functions look like?

i) The easiest one is the AFC function when $y=0$ it is infinite, and as y increases the AFC decreases towards zero.

ii) The variable costs eventually

increase as output is increased.

iii) The combination of these two effects produces a U-shaped average cost curve.



⇒ **Marginal Costs:** (Derivative of TC)

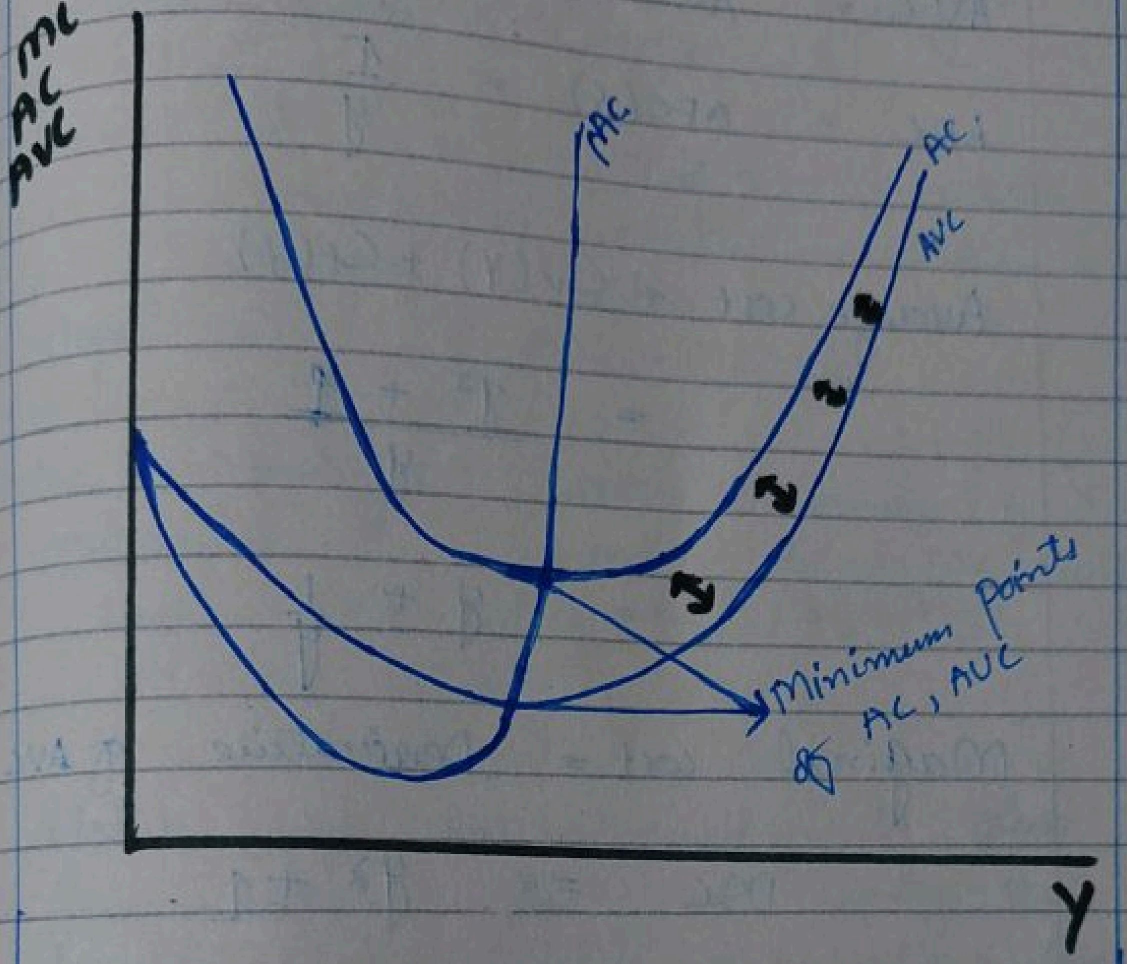
The marginal cost curve measures the change in costs for a given change in output.

As such this is just the first derivative of the total cost function,

$$C(Y) = c_v(Y) + F$$, that is.

$$\frac{dc(Y)}{Y} = \frac{dc_v(Y)}{Y} + 0$$

The +0 enters is because fixed cost, Fixed cost



As we can see that the AC and AVC are tending to each other ~~all~~ as the output is increasing and because the only difference b/w them is the average fixed cost.

⇒ Example of the cost curves

lets consider $C(Y) = Y^2 + 1$

Variable cost $= Y^2 = C_v(Y)$

donot changes as output Changes.

→ **Characteristics:**

i) Average variable cost may initially slope down but not need. It will eventually rise as long as there are fixed factors that constrain production (we need machine/labor because of low output so it will eventually rise)

ii) Average cost will initially fall due to declining fixed costs but then rise due to the increasing AVC.

iii) The MC and AVC are the same at the first unit of output.

iv) The marginal cost passes through the minimum point of both the AVC and AC curves.

⇒ **Graphically:**

(Chapter # 21) ⇒ cost curves

Fixed cost : $C_f(y) = 1$

$AVC = AVC(y) = \frac{y^2}{y} = y$

$AFC = AFC(y) = \frac{1}{y}$

Average cost $= C_v(y) + C_f(y)$

$= \frac{y^2 + 1}{y}$

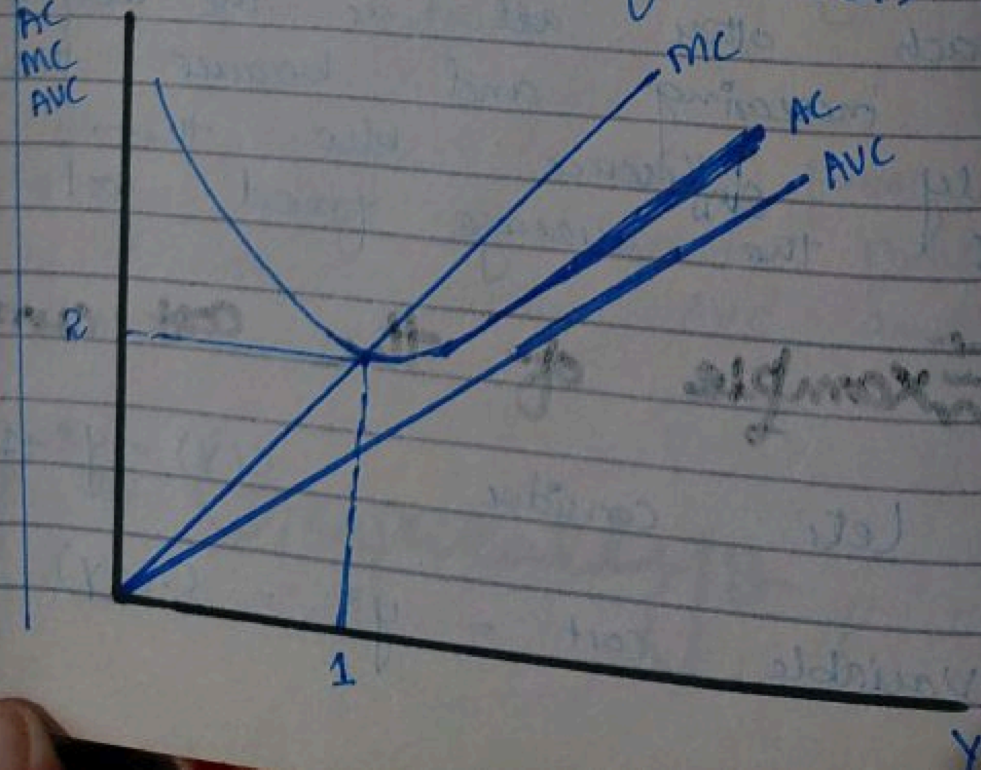
$= y + \frac{1}{y}$

Maginal cost = Derivative of AVC

$MC = y^2 + 1$

$MC = 2y$

The cost curves for $C(y) = y^2+1$



i) Here the (AVC = y) average variable cost is a straight line with slope 1.

ii) Then it is simple to draw the marginal cost, which is a straight line with slope 2. (MC = 2y)

iii) The average cost reaches its minimum where AC = MC which says

$$y + \frac{1}{y} = 2y,$$

which can be solved to give $y_{min} = 1$. The AC at $y = 1$ is 2, which is also the marginal cost.

⇒ End (Completed) Ans

Chapter # 22 Firm Supply

In this Chapter we will see how to derive the supply curve of a competitive firm from its cost function using the model of profit maximization. The first thing we have to do is to describe the market environment in which the firm operates.

→ **Perfect competition:**

We will know consider the market environment of a "perfect competition".

↳ We say a market is perfectly competitive if each firm is a price taker; that is no individual firm is able to influence the market price.

↳ We assume that in a perfectly competitive market $P = MC$; any firm selling at $P < MC$ earns losses, any firm offering a price $P > MC$ makes no sales.

↳ Essentially firms need only

focus on their quantity decisions when the market is perfectly competitive.

Supply Decision of a Competitive Firm:

- In a competitive market the firm's maximization problem is

$$\max_y \underbrace{py}_{\text{Revenue}} - \underbrace{c(y)}_{\text{Total cost}}$$

- For a case of a competitive firm, marginal revenue is simply the price.

- How much extra revenue does a competitive firm get when it increases its output by Δy?

$$\Delta R = p\Delta y$$

- So, the extra revenue per unit of output is given by

$$MR = \frac{\Delta R}{\Delta y} = p$$

→ A competitive firm will choose a level of output y where the marginal cost that it faces at y is just equal to the market price.

$$P = MC(y)$$

→ For a given market price "P", we want to find the price where profits are maximized.

i) If the price is greater then marginal cost at some level of output y, then the firm can increase its profits by producing a little more output.

ii) Price greater then marginal cost means

$$P - \frac{\Delta c}{\Delta y} > 0$$

So, increasing output by Δy means that ⇒

$$P\Delta Y - \frac{\Delta C}{\Delta Y}\Delta Y > 0$$

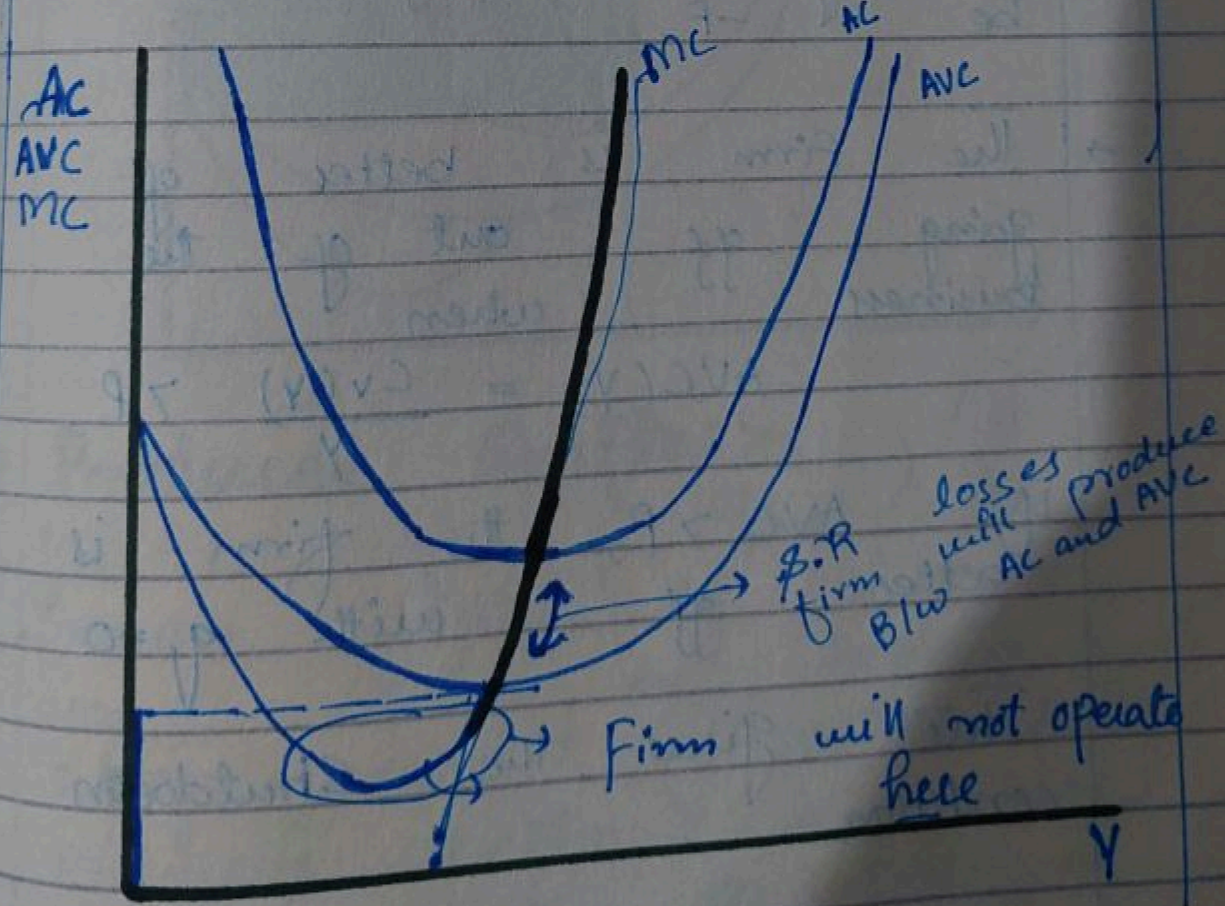
Simplifying we find.

$$P\Delta Y - \Delta C > 0$$

This shows that the increase in revenues from increasing output will exceed the increase in cost : Profit increases

(iii) At the optimal $P = MC$

Supply Curve is MC above AVC &



important

→ The supply curve is the portion of the MC curve that lies above the average variable cost (AVC) curve.

→ The firm will not operate where MC < AVC because it can have greater profits (less losses) by shutdown.

→ When the firm produces zero output it still must pay fixed costs, F; by producing zero profits will be −F.

→ The firm is better off going out of the business when

$$AVC(y) = \frac{c_v(y)}{y} > P$$

If AVC > P, the firm is better off with $q = 0$

This gives the shutdown condition.

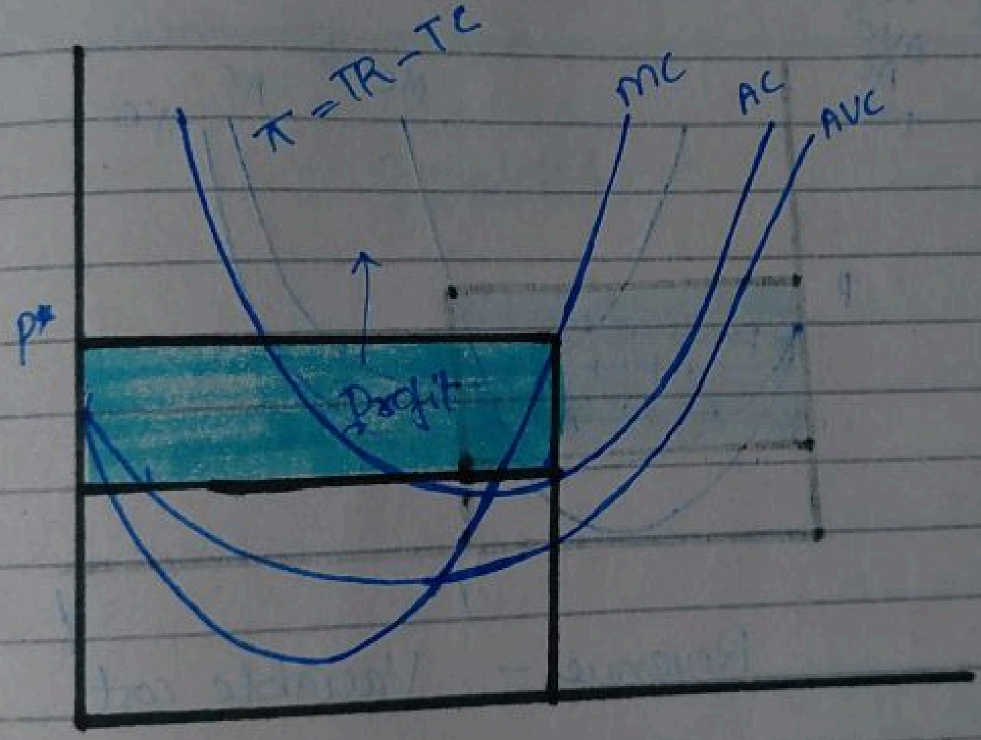
Profits and producer surplus:-

Profits :-

Profits are the difference between the total revenue and total cost.

$$\pi = TR - TC$$

Graphically :-

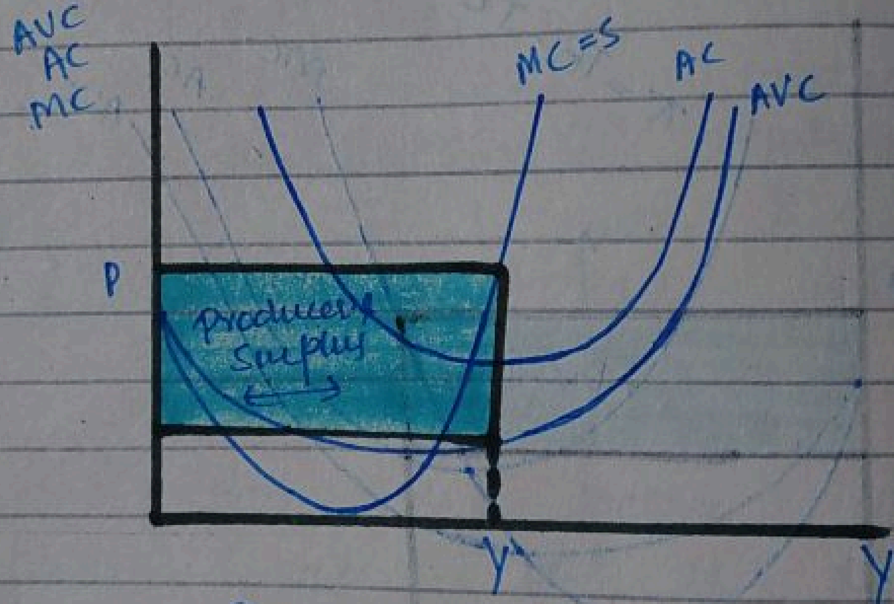


Producer Surplus :-

We define the producer surplus to be the area to the left of the supply curve. More precisely producer's surplus is closely related to the profits of firms. Producer surplus is equal to revenues minus variable costs.

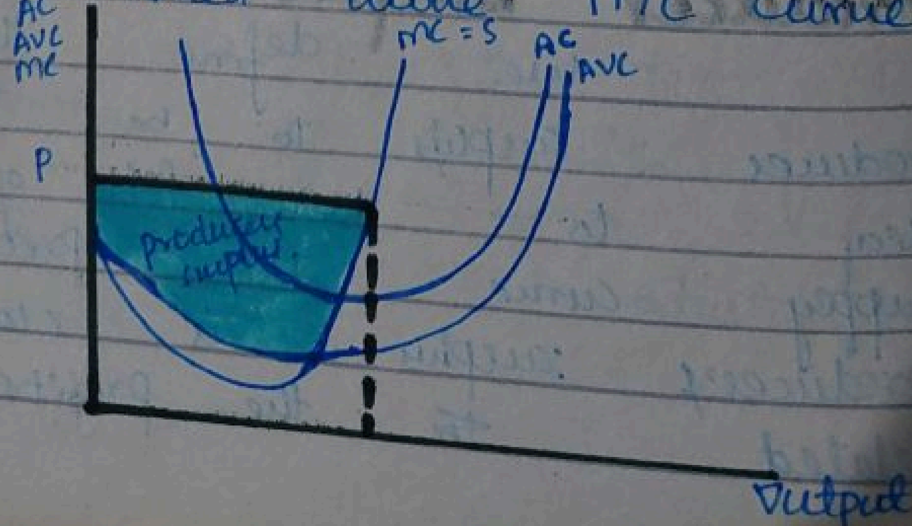
⇒ Ways to measure the producer's surplus by using the marginal cost curves itself.

i) P.S = TR − VC So:

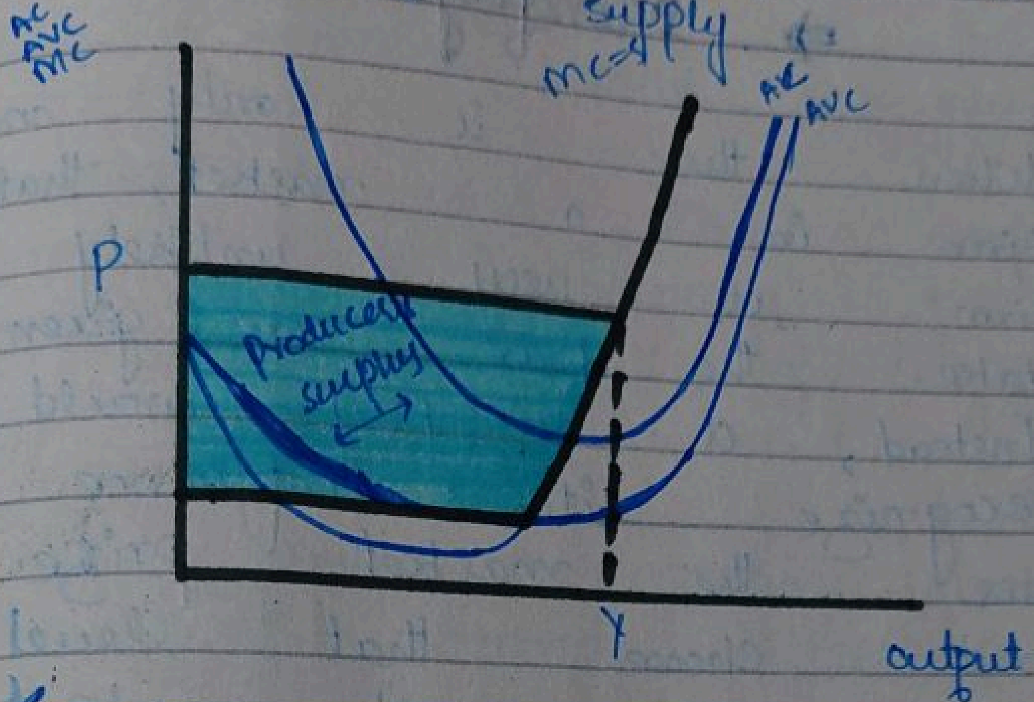


Revenue − Variable cost

ii) Area above MC curve



iii) Area under Price and above supply.



⇒ Completed

{Chapter # 24}

⇒ Monopoly :

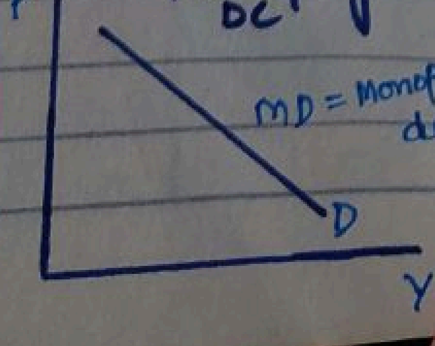
→ When there is only one firm in a market, that firm is very unlikely to take the price as given. Instead, a monopoly would recognize its influence over the market price and choose that level of price and output that maximized its overall profits.

→ A monopoly therefore faces the entire market demand

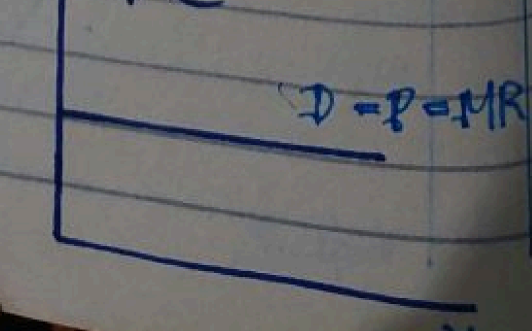
* A monopoly demand curve is downward sloping.

* The condition of facing a downward sloping demand curve is also known as market power.

Monopoly DC



PC



⇒ A monopoly does not take the market price as given.

i) However, much like a competitive firm it searches for its optimal price by comparing its MR = MC.

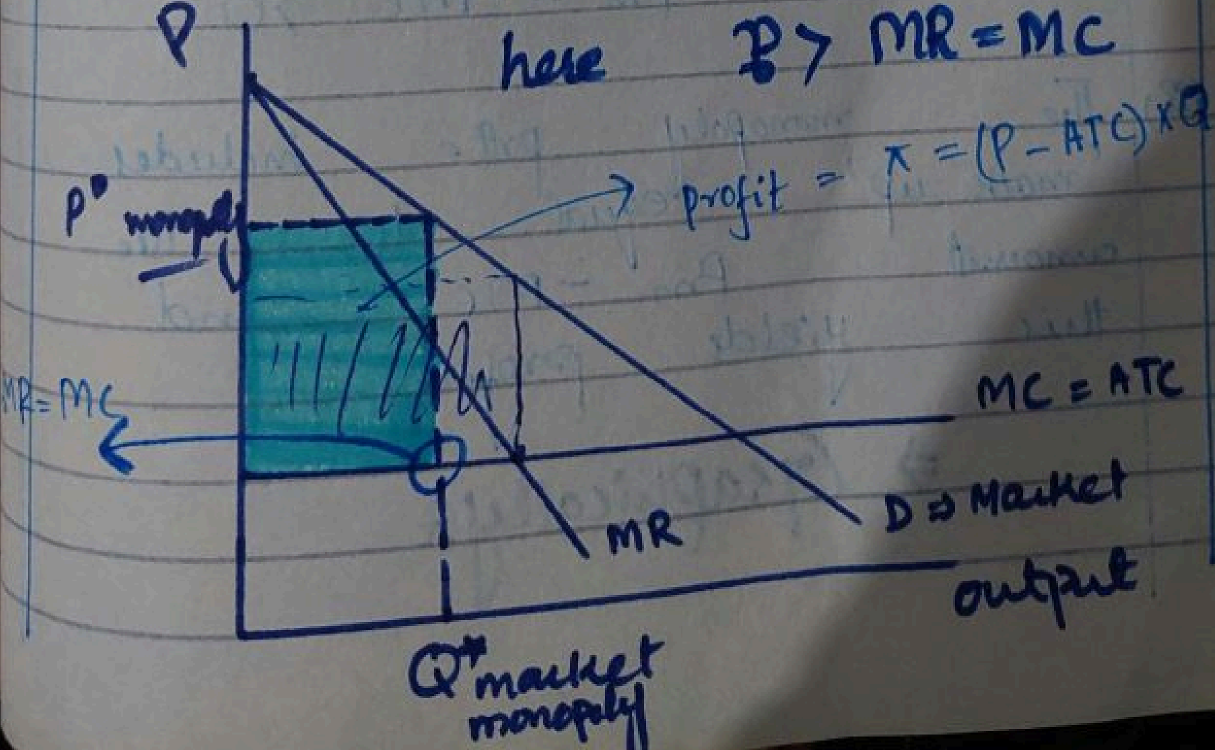
ii) The monopoly produces where MR = MC and because demand is downsloping,

$$P > MR = MC$$

iii) By contrast, the competitive firm produces where MR = MC but P = MR so P = MR = MC.

Monopoly produces output where MR = MC.

here P > MR = MC



→ The monopoly maximizes profit by

1) Finding where $MR = MC$ to determine its optimal output, Q_m.

2) Comparing that output to the demand curve to determine its price, P_m.

3) Profits are just $(P - ATC) \times Q$

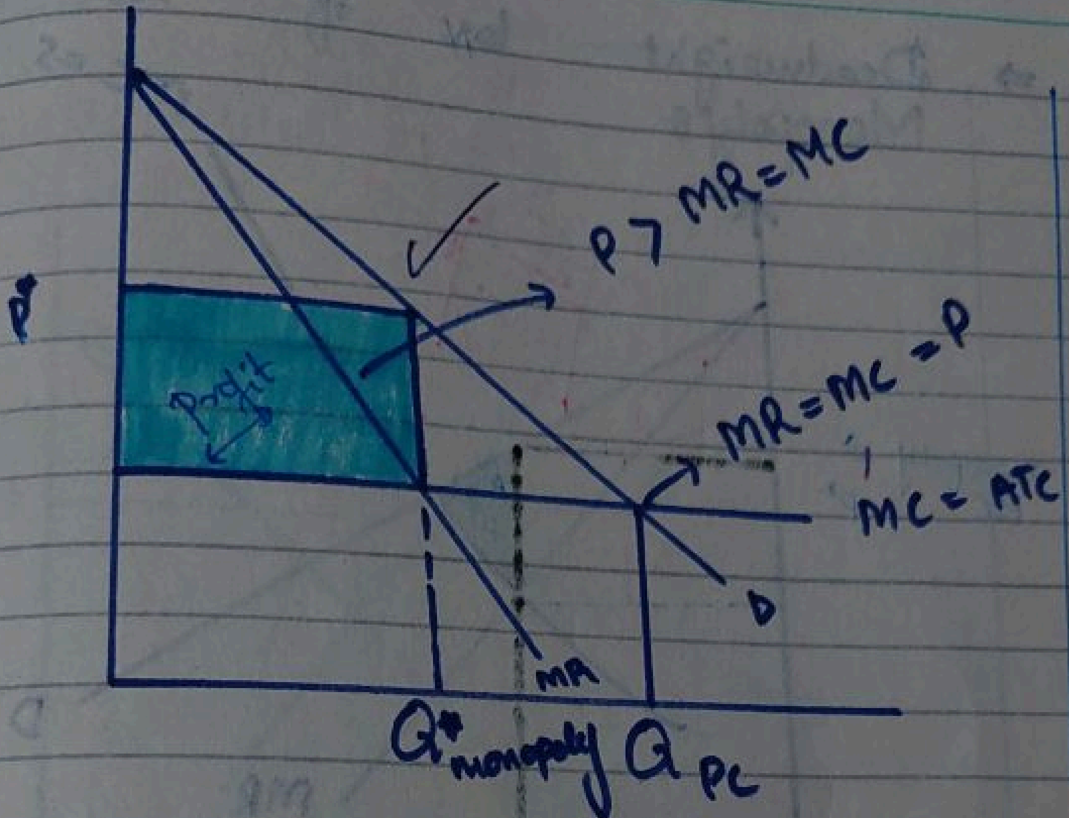
Comparison b/w PC and Monopoly :

i) In a competitive market firms set $P = MC$

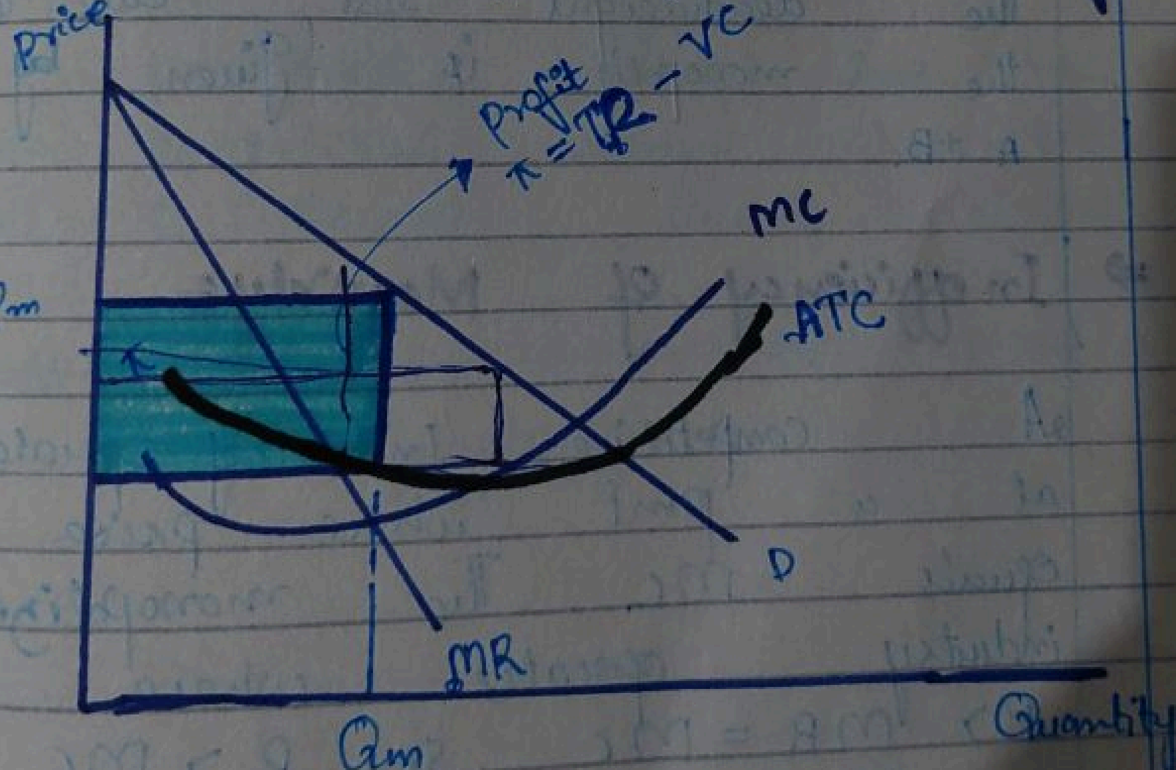
ii) For the monopoly, since $P_m > MR = MC$ we have $P_m - MC > 0$

iii) The monopoly price includes 'mark up' equal to the amount $P_m - MC$ and this yields profit.

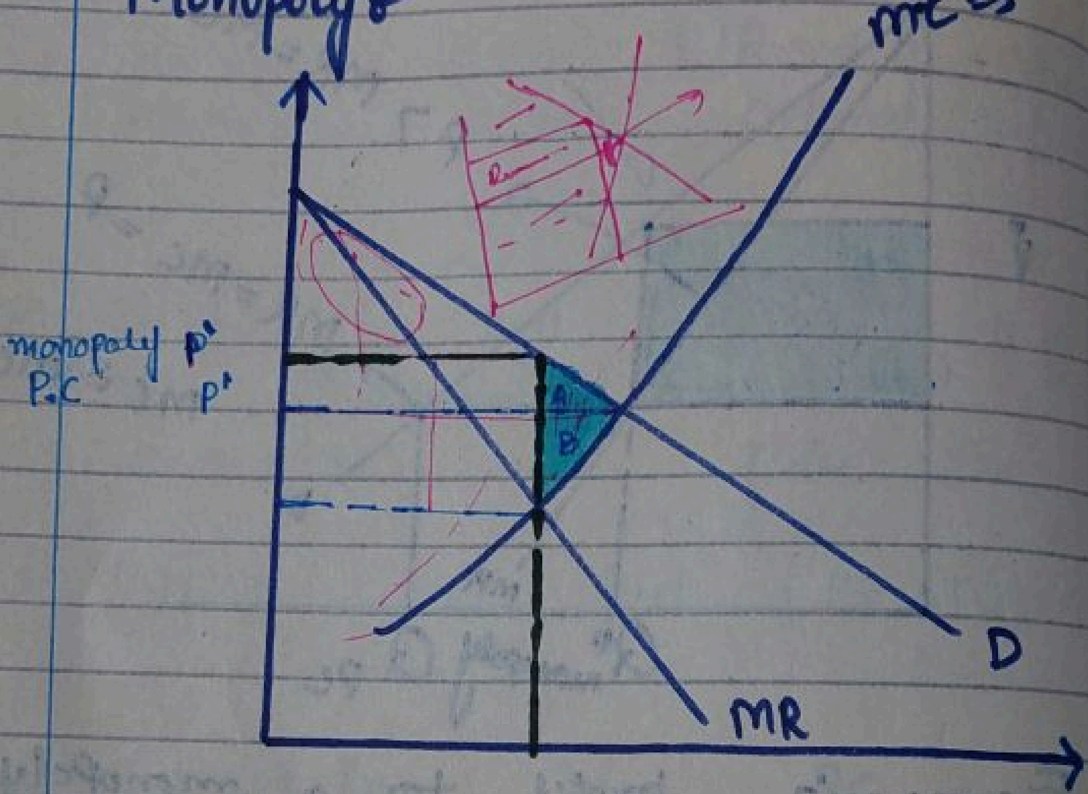
⇒ Graphically :



⇒ Economic profit for a monopoly :



⇒ Deadweight loss of the Monopoly's

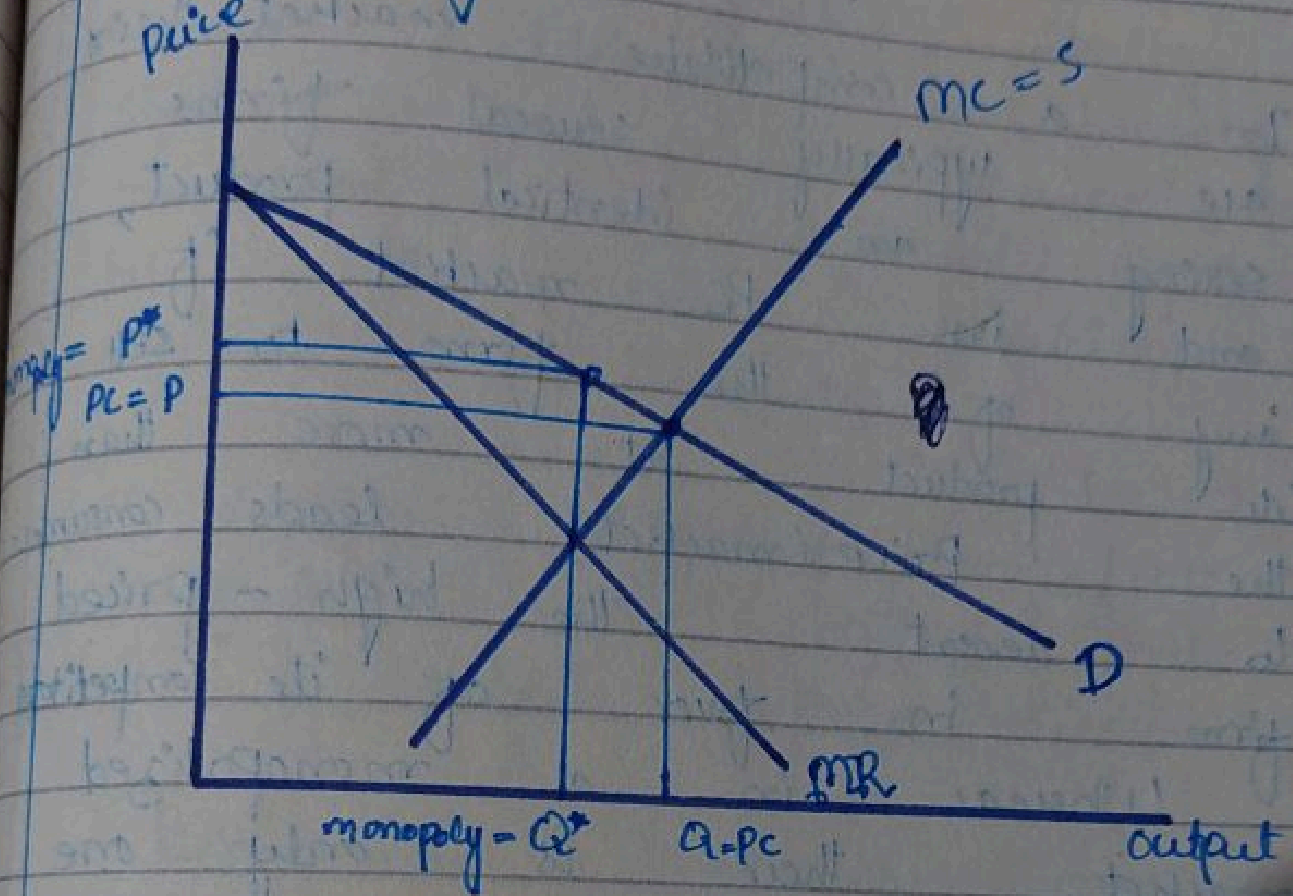


The deadweight loss due to the monopoly is given by A +B.

⇒ Inefficiency of Monopoly's

A competitive Industry operates at a point where price equals MC. The monopolized industry operates where P > MR = MC, so P > MC. Thus in general the price will be higher and the output lower if a firm behaves monopolitically rather than competitively.

Graphically:



A monopolist produces less than the competitive amount of output and is therefor Pareto inefficient.

⟺

⇒ Completed:

←x—x—x→

Chapter # 25

Monopoly Behaviour

In a competitive market their are typically several firms selling an identical product, and in PC market if any of the firm to sell its product at more than the Price (market) leads consumers to desert the high - priced firm in favor of its competitors. Whereas in a monopolized market there is only one firm selling a giveen product. When a monopolized firm rises its price it losses some, but not all, of its customers,

So in monopoly the firm has some degree of monopoly power it as more options open to it Than a firm in perfectly competitive industry, So in this Chapter we will examine how firms can enhance and exploit their market power.

Price Discrimination :

1) Price discrimination is a microeconomic pricing strategy where identical or largely similar goods or services are transected at different price by the same provider in different markets.

"Selling different units of output at different prices is called price discrimination".

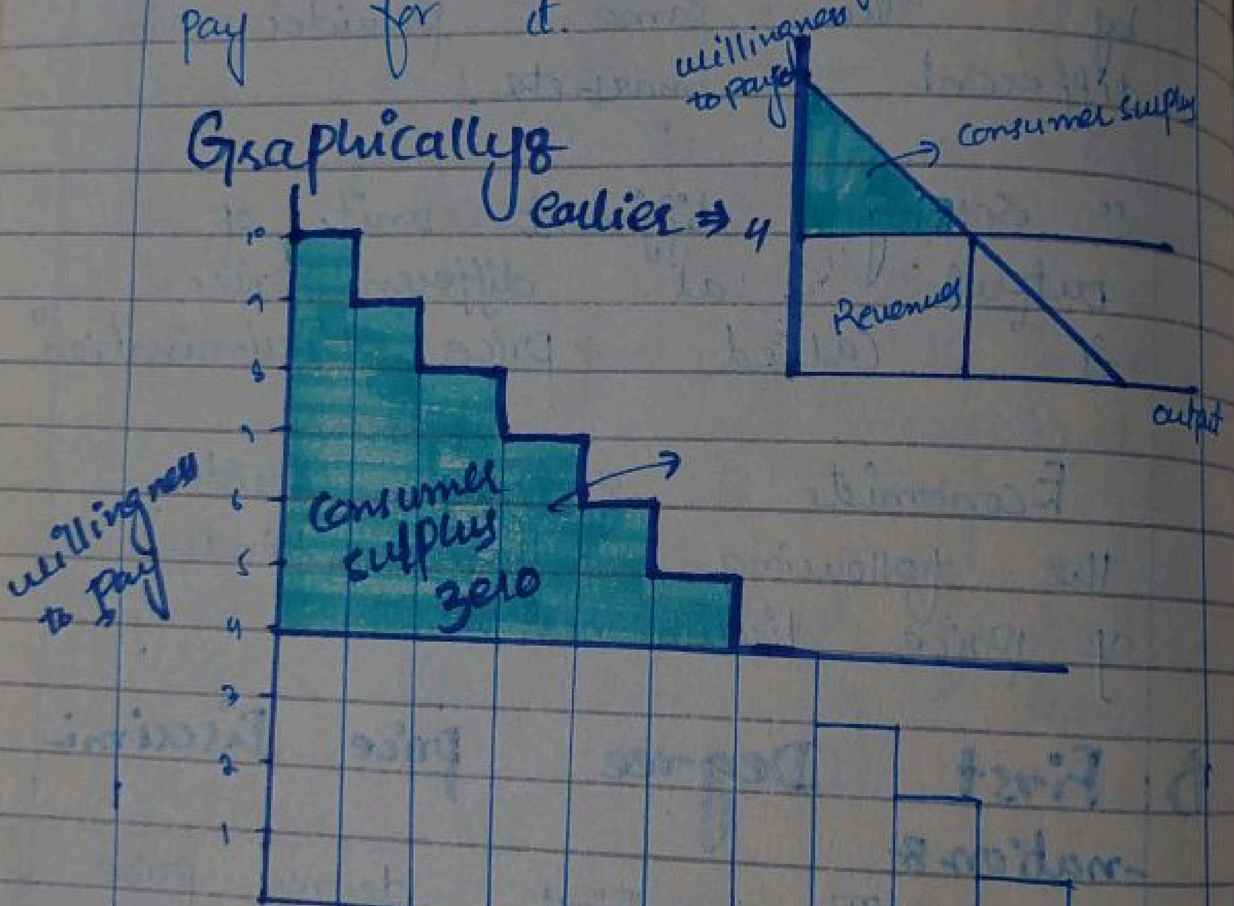
Economists generally consider the following three kinds of price discriminations.

i) First Degree price Discrimination :

The First degree price discrimination means that the monopolists sells different units of output for different prices and these prices may differ from person to person. This is sometimes known as the case of perfect price discrimination.

In the 1st degree each unit of a good is sold to the individual who values it most highly, at the maximum price that this individual is willing to pay for it.

Graphically:



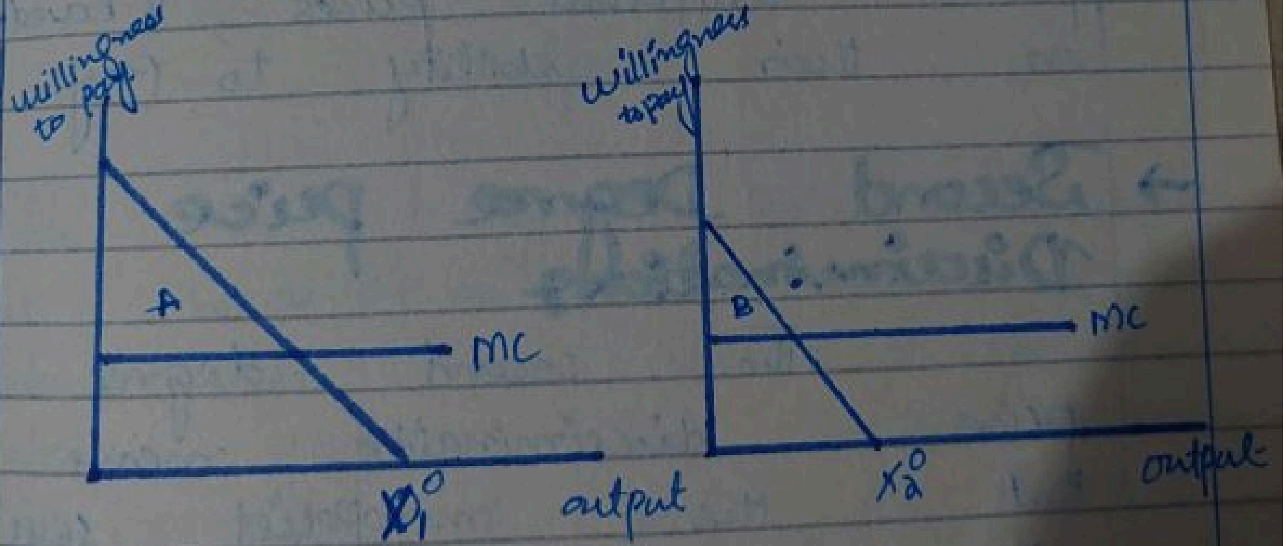
Here $MR = D$

Here the producer will sell each unit of the good at the maximum price it will command.

which yields it the maximum possible profit. Here the producer ends up getting all the surplus generated in the market.

We have interpreted the first - degree price discrimination as selling each unit at a maximum price it will command. But we could also think of it as selling a fixed amount of a good at a "take it or leave it" price.

→ **Two consumers with different willingness to pay:**

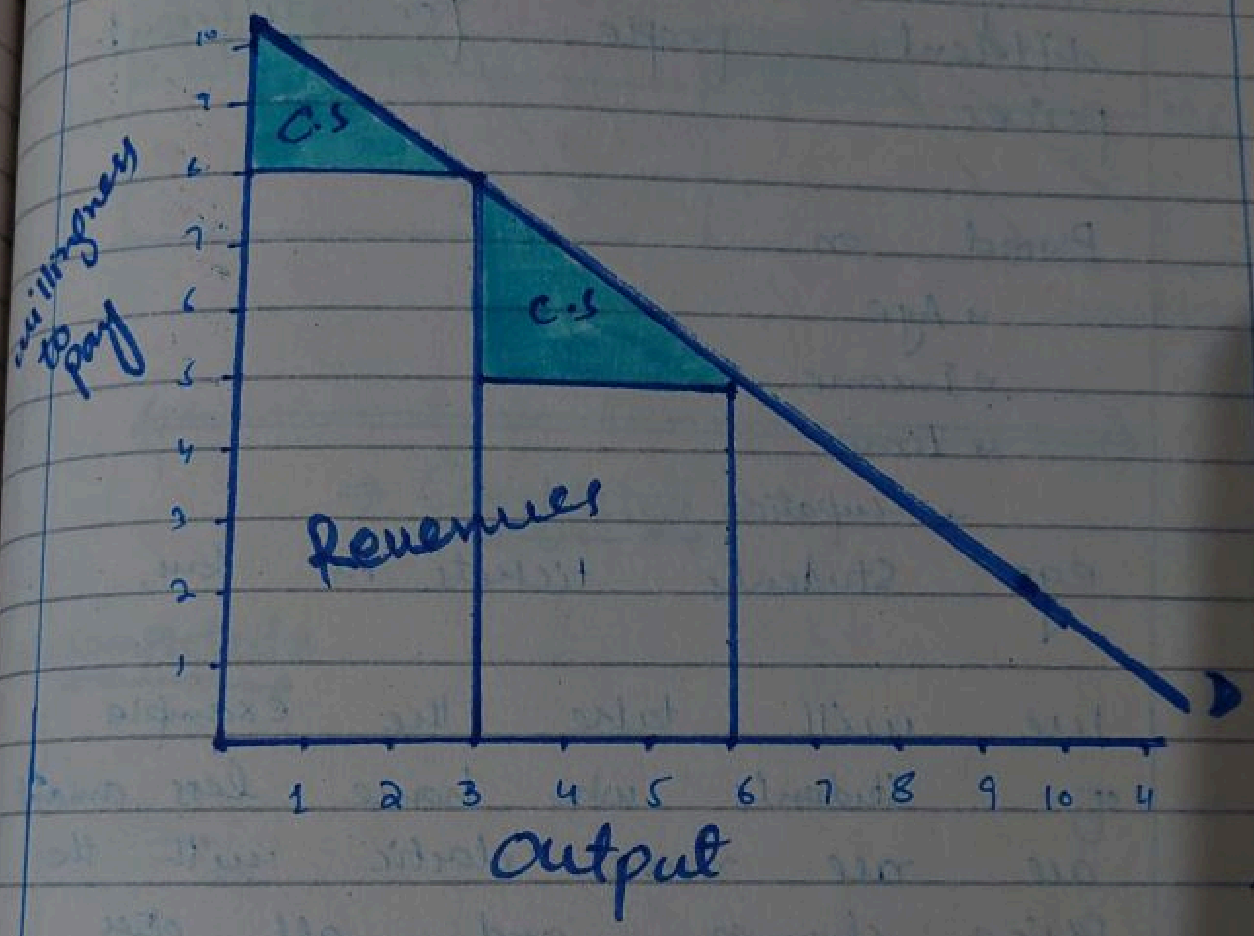


Here the monopolist would offer to sell x_1^0 units of the good to person 1 at the price equal to the area under person 1's demand curve and offer to sell x_2^0 units of a good to person 2 at a price equal to the area under persons 2's demand curve. As before, each person would end up with zero consumer surplus, and the entire surplus of A+B would end up in the hands of the monopolists.

The closest example would be something like a small town doctor who charges its patients different prices, based on their ability to pay.

→ **Second Degree Price Discrimination**

The second degree price discrimination means that the monopolist sells different units of output for different prices, but every individual who buys the same amount of the goods pays the same price. Thus price differ across the units of the good, but not across people. The most common example of this is bulk discounts.



The 2nd degree price discrimination is based on the amount of volume | sales as such in the above graph that the customers who buys 6 units are charged 5 each unit and the customer who buys 3 units are charged 8 per unit.

→ Third Degree price discrimination:

The third degree price discrimination occurs when the monopolists sells output to different people for different prices

Based on
- Age
- Income
- Time
- occupation

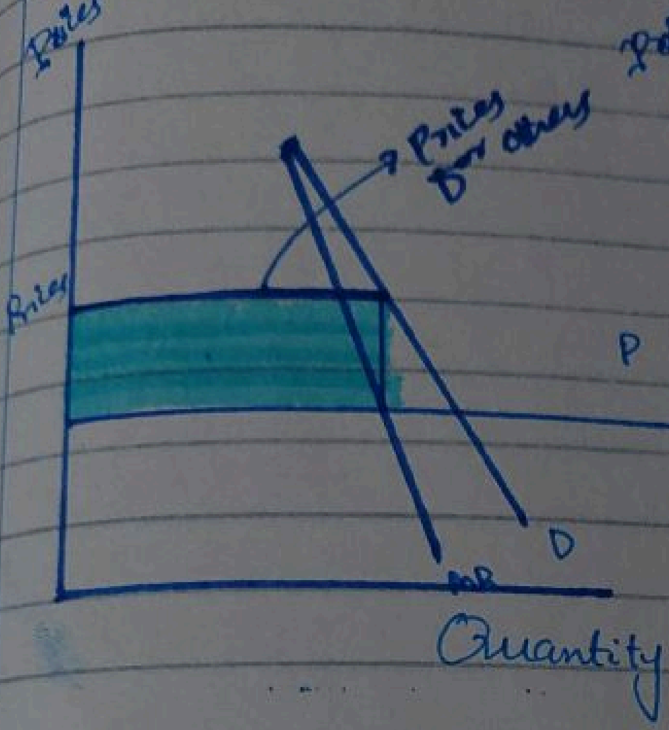
eg: Students tickets in bus.

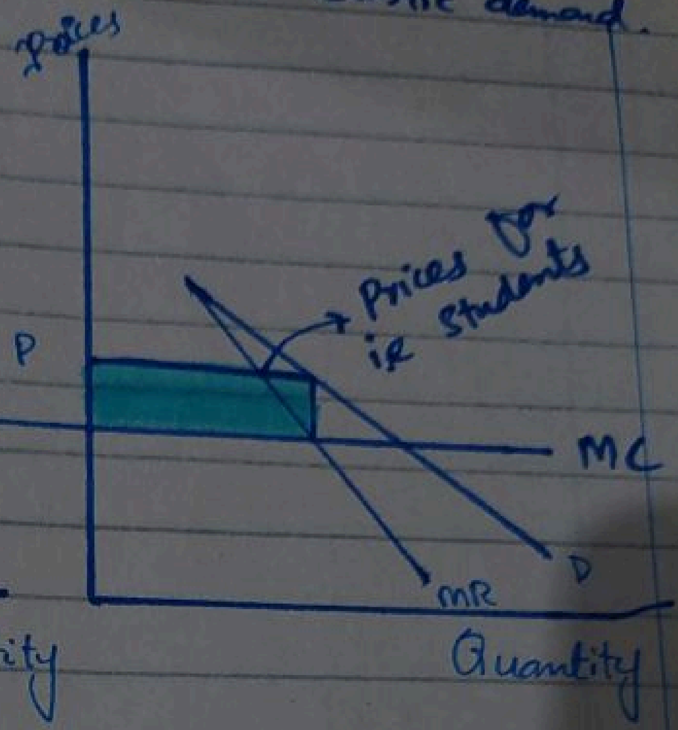
We will take the example of Students who have less amount are more elastic with the Price change and all other who are less elastic (inelastic with the changes in price, so the Price discrimination will be

⇒ Graphically:

Inelastic demand

Elastic demand.





⇒ Completed 8

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