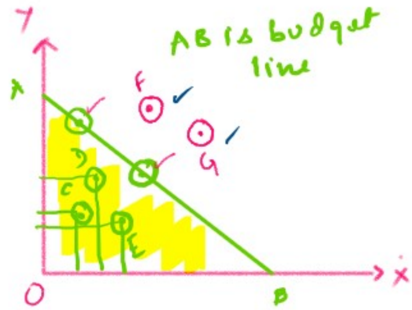
19 July 2023 08:26 PM

Budget Equation: $M = x \cdot P_x + y \cdot P_y$

Tot Income = Total expenditure

Budget Line: locus of different combination of purchase of two commodities (x, y) with his/her income (M) constant. (every point on AB indicates Tot income = Tot exp)



It is a downward sloping straight line with slope = ratio of prices of two goods x & y $= -\frac{P_x}{P_y}$

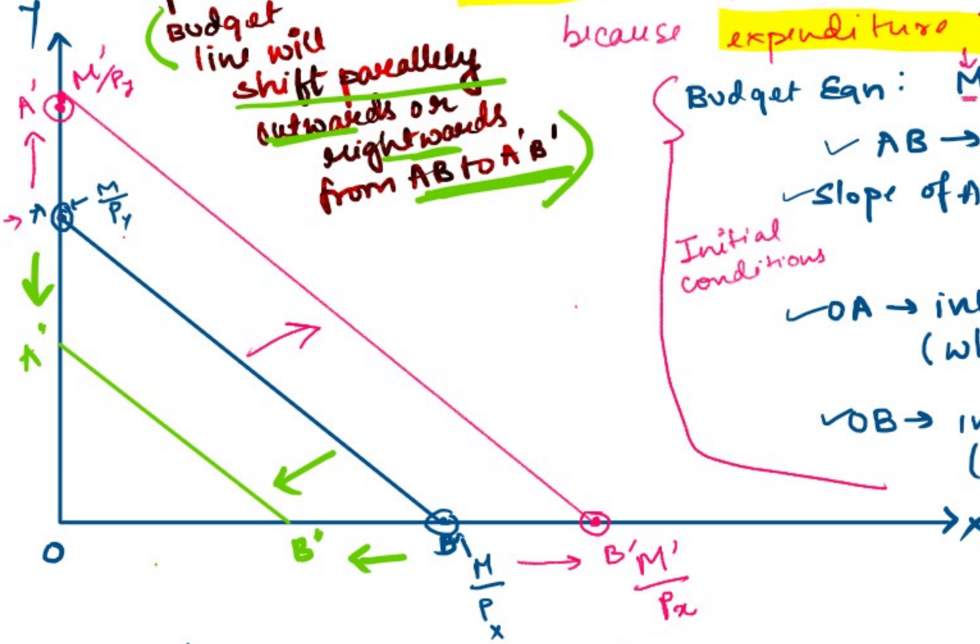
points like C, D, E indicates expenditure < income.

(shaded area △OAB is feasible area)

point like F and G ⇒ not feasible because not affordable because expenditure > income.

Case 1: Income (M) increases (with P_x and P_y const)

Budget line will shift parallely outwards or rightwards from AB to A'B'



[decrease in income Budget line shifts left from AB to A''B''.]

Initial conditions:

Budget Eqn: $M = x P_x + y P_y$ → M = income, P_x = Price, P_y = (These are const)

✓ AB → budget line

✓ slope of AB $= -\frac{P_x}{P_y}$

✓ OA → intercept on Y-axis (when $x = 0$, $Y = \frac{M}{P_y}$)

✓ OB → intercept on x-axis (when $y = 0$, $x = \frac{M}{P_x}$)

NOTE: since prices (P_x & P_y) are fixed.

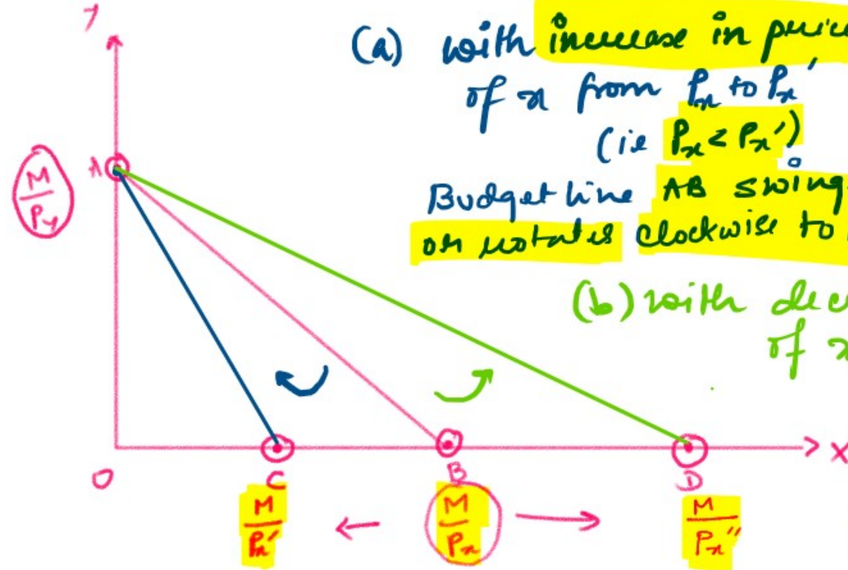
∴ slope of AB = A'B' = A''B'' = ratio of prices $= -\frac{P_x}{P_y}$

Case 2: Let us change price of x (P_x) and keep income (M) and price of y (P_y) const.

Y

(a) with increase in price

slope of AB $= -\frac{P_x}{P_y}$

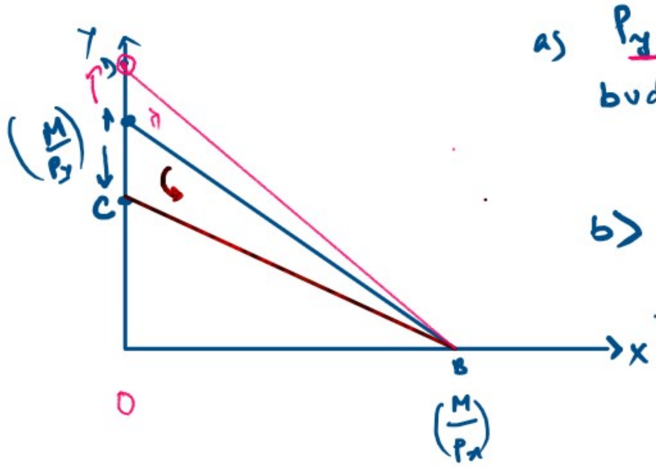


(a) with increase in price of x from P_x to P_x' (ie $P_x < P_x'$)
Budget line AB swings or rotates clockwise to AC

- slope of AB = $-\frac{P_x}{P_y}$
- OA → $\frac{M}{P_y}$
- OB → $\frac{M}{P_x}$

(b) with decrease in price of x from P_x to P_x'' (ie $P_x > P_x''$) budget line rotates anticlockwise to AD.

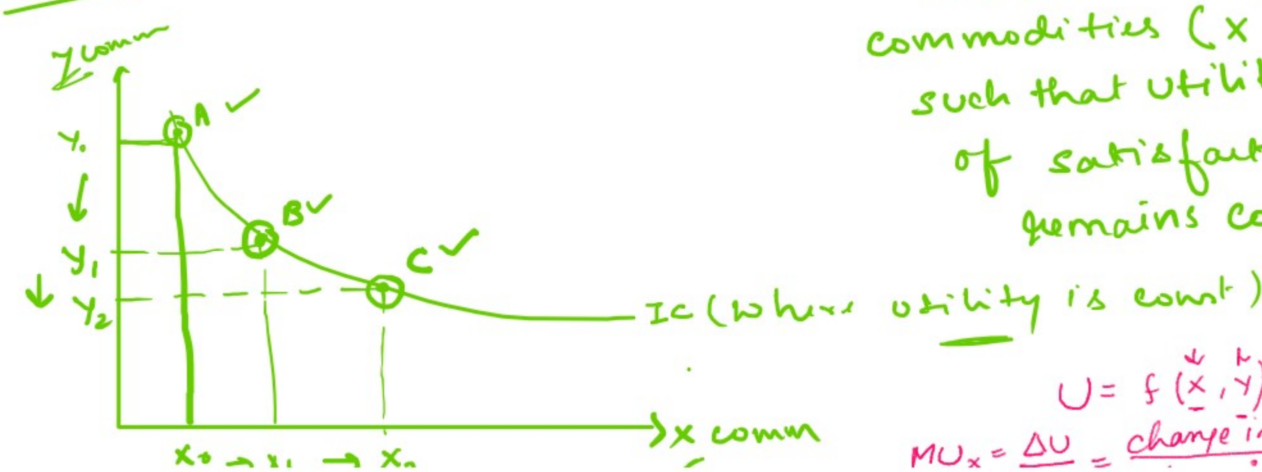
Case 3: Price of y (P_y is changing) with P_x and M const.



a) P_y ↑ses.
budget line rotates clockwise from AB to AC.

b) P_y ↓ses
budget line rotates anticlockwise from AB to AD.

Topic Indifference Curve : locus of different consuming combination of two commodities (x and y), such that utility (level of satisfaction) remains constant.



$U = f(X, Y)$ (utility)

$MU_x = \frac{\Delta U}{\ldots} = \frac{\text{change in satisfaction level}}{\ldots \text{consumption of X}}$

$U = f(x, y)$ (utility)

$MU_x = \frac{\Delta U}{\Delta X} = \frac{\text{change in satisfaction level}}{\text{change in consumption of } X}$

Properties of Indifference Curve : ① Slope of Indifference curve

ie $\frac{\Delta Y}{\Delta X} = -\frac{MU_x}{MU_y} = -\frac{\Delta U/\Delta X}{\Delta U/\Delta Y} < 0$

$\frac{\Delta Y}{\Delta X}$ → change in consumption of Y due to change in consumption of X commodity.

(*) Indifference curve is negatively sloped.

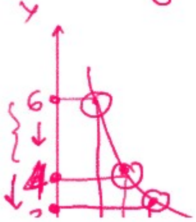
② Indifference curve is CONVEX to the the origin.

$MRS_{x,y}$ ⇒ Marginal Rate of Substitution between X and Y commodity

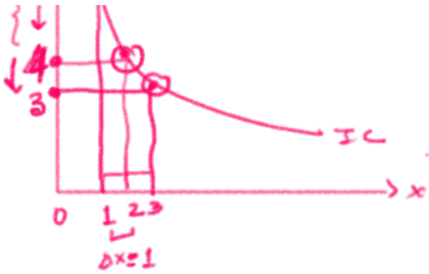
$MRS_{x,y} = \frac{\Delta Y}{\Delta X}$ ⇒ $MRS_{x,y}$ is defined as the rate at which Y commodity is sacrificed (substituted) or (give up of the consumption of Y) to increase consumption of X by one extra unit such that the level of satisfaction (ie utility remains constant).

NOTE:

(*) $MRS_{x,y}$ is diminishing ⇒ hence indifference curve is convex to the origin.



initially I am giving up 2 units of 'y' for 1 unit of extra 'x'.



2 units of 'y' for 1 unit of extra 'x'.

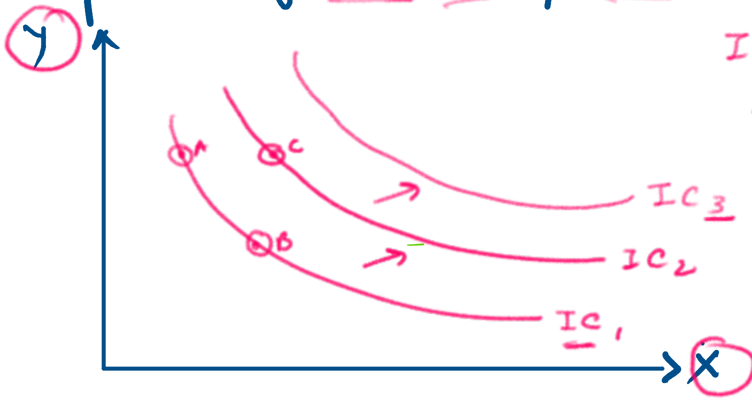
✓ Later I am giving up only 1 unit of 'y' for another 1 extra unit of 'x'

∴ sacrifice or substitution of 'y' is decreasing.

∴ MRS is diminishing

∴ IC is convex.

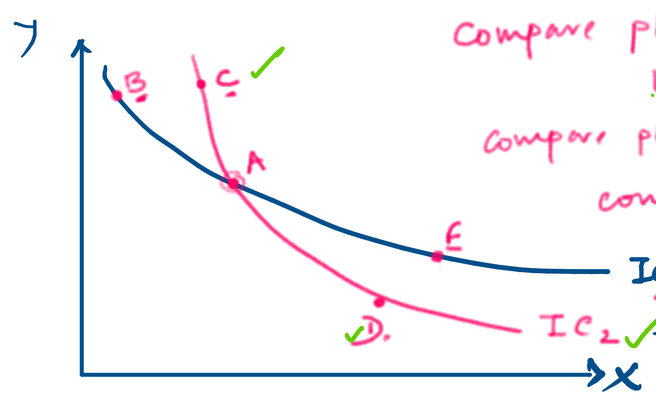
③ Higher IC implies higher level of satisfaction (i.e. utility)



$IC_1 < IC_2 < IC_3$ in level of utility or satisfaction.

⇒ Indifference map ⇒ drawing more than one IC.

④ Two Indifference Curve can never intersect each other.



Compare pt B and pt C
$U_1 < U_2$ — ①

Compare pt A : $U_1 = U_2$ — ②

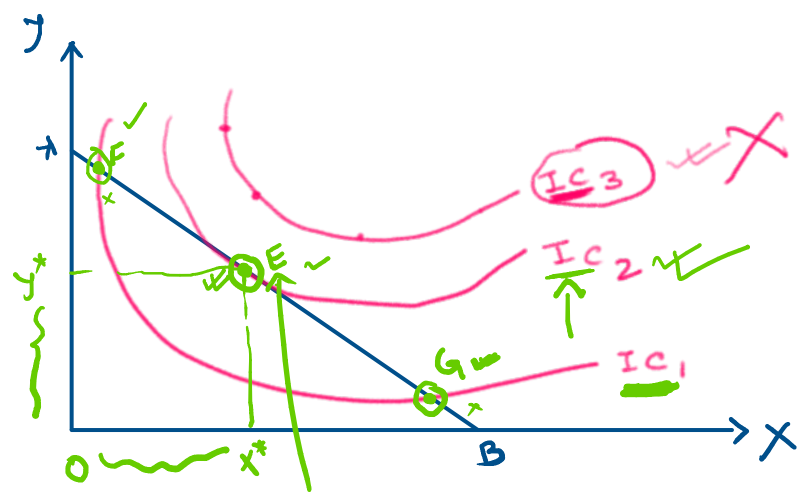
Compare pt E and D
$U_1 > U_2$ — ③

①, ② and ③ contradicts each other and violates each other and violates property 3.

∴ Two ICs cannot intersect each other.

Topic : Consumer's Equilibrium :

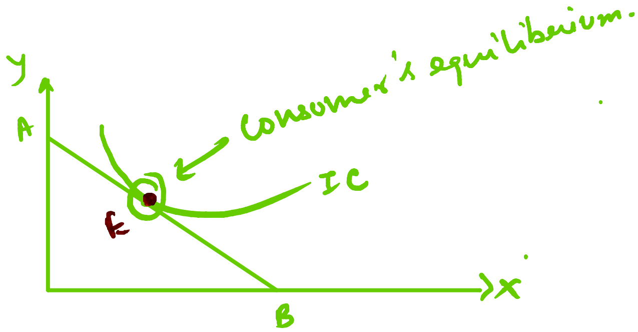
It is a point where a consumer maximises his/her utility (level of satisfaction) with a given level of income (M).



pt E is the consumer's equilibrium.

choosing bundle E (x*, y*)
ie, optimum level of x and y consumption (which maximises utility (IC2) with given income (AB).

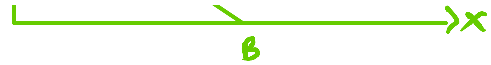
Condition for Consumer's Equilibrium:



(tangency between budget line AB and indifference curve IC.)

slope of IC = slope of budget line

$$-\frac{MU_x}{MU_y} = -\frac{P_x}{P_y}$$



$$-\frac{MU_x}{MU_y} = -\frac{P_x}{P_y}$$

$$\boxed{MRS_{x,y} = \frac{P_x}{P_y}}$$