Course

on

HS205: consumer Behaviour and Welfare Economics

3rd semester

2020

Instructor

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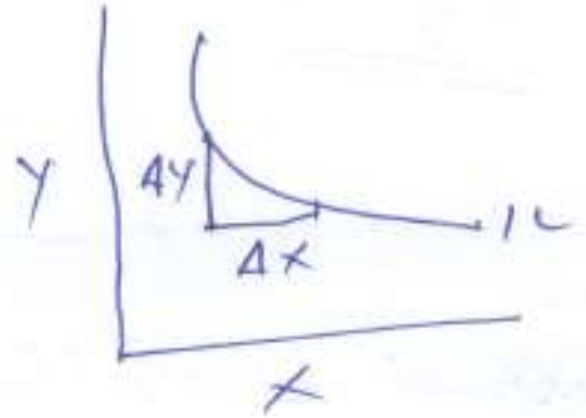
Lecture 2: Consumer's Equilibrium:

MRS (Marginal rate of substitution)

MRS of x of Y as the amount of Y whose loss can be compensated by a unit gain in x.

MRS of x for Y represents the amount of Y which the consumer has to give up for the gain of one additional unit of x so that his level of satisfaction remains the same



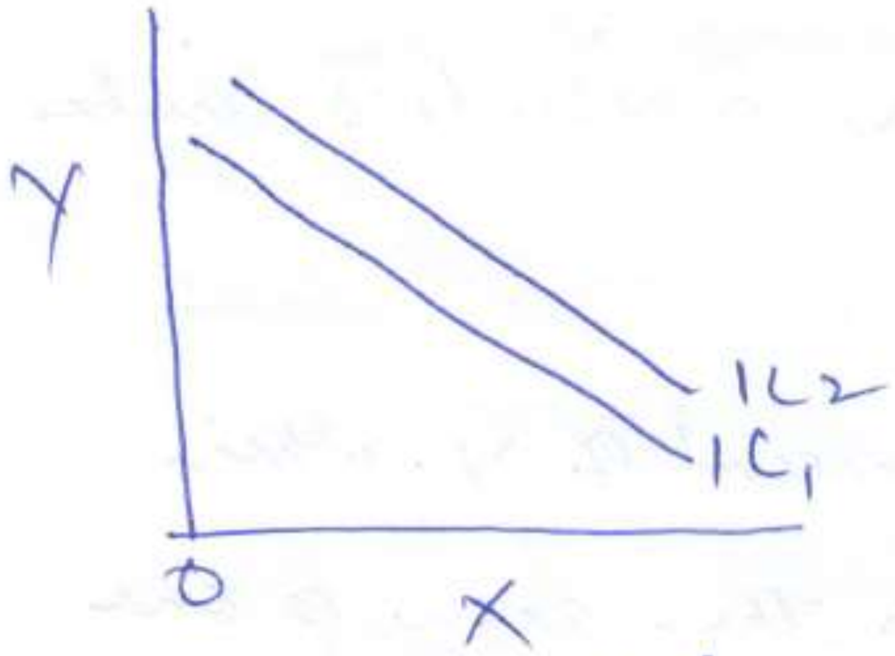
x

Relationship between MRS & marginal utilities

An IC can be represented by
$$U(x,y) = a \quad \text{---(1)} \quad \left[\because a = \text{constant utility}\right]$$

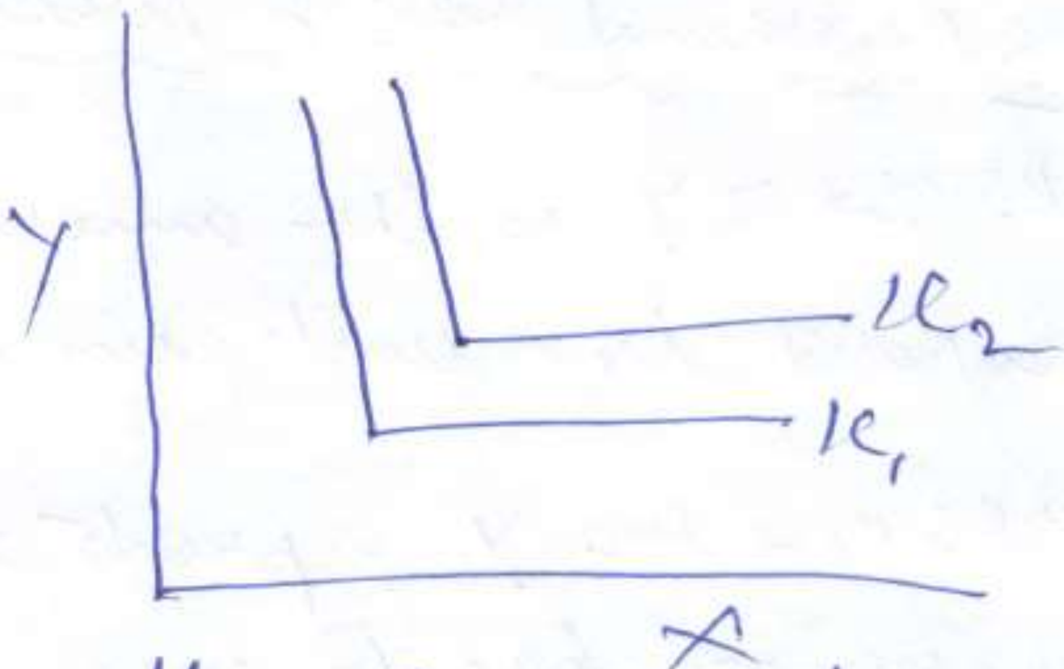
Taking total utility of (1)

we have:
$$\frac{\partial U}{\partial x} dx + \frac{\partial U}{\partial y} dy = 0$$
$$\Rightarrow MU_x \, dx = - MU_y \, dy$$
$$\Rightarrow -\frac{dy}{dx} = \frac{MU_x}{MU_y}$$
$$-\frac{dy}{dx} = MRS = \frac{MU_x}{MU_y}$$



ICs of perfect substitutes

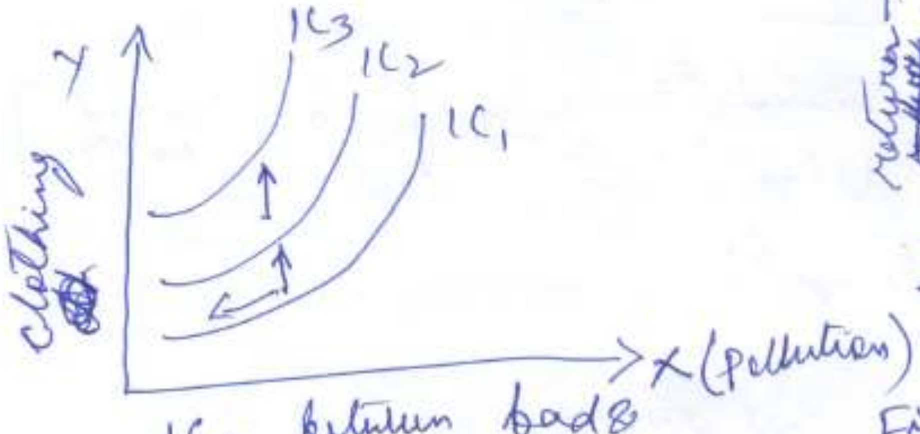
Fig: A



ICs of perfect complements

Fig: B

Some Non-standard or non-normal cases of IC :



ICs between bads & good goods

Fig: 1

Fig: 2

Fig: 3

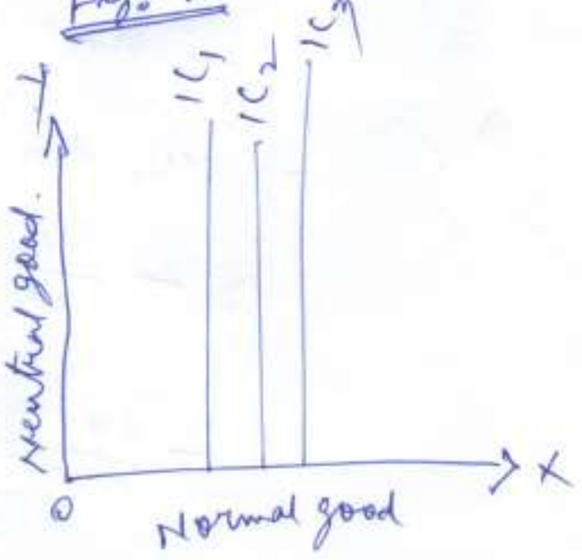


Fig: 4

Budget line :

It shows all these combination of two goods which the consumer can buy spending his money income on the two goods at their given prices.

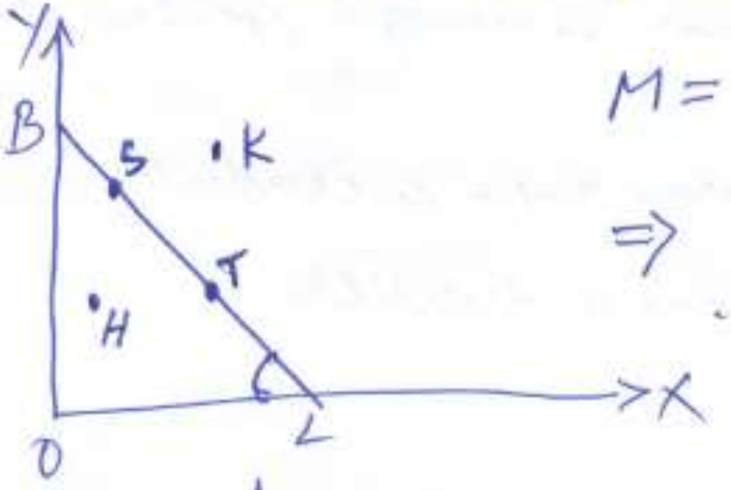


Fig: 1

$$M = P_x X + P_y Y$$

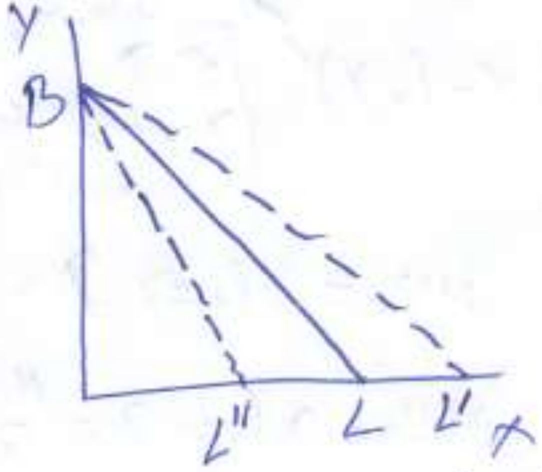
$$\Rightarrow P_y Y = M - P_x X$$

$$\therefore Y = \frac{M}{P_y} - \frac{P_x}{P_y} X$$

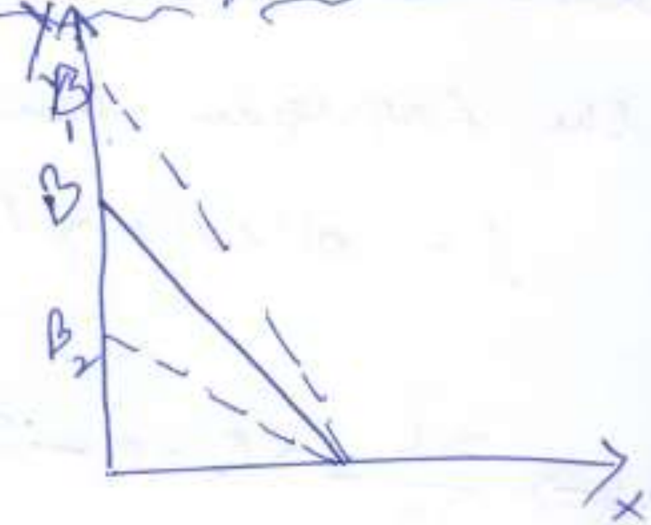
slope of budget line

OBL is known as the budget space

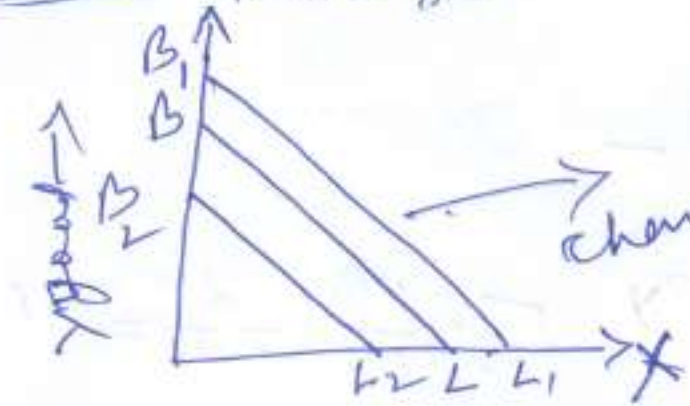
changes in Budget line & shift in budget line



(Fig: 1) when price of X changes



(Fig: 2) when price of Y changes



changes in buget line when income changes

Consumer's equilibrium: Maximum Satisfaction

Assumptions

1. The consumer has a given indifference map
2. He has a fixed income of money to spend on the two goods
3. Prices of the goods are given & constant.
4. Goods are homogeneous & divisible.

mathematical derivation

Let, $U = f(x, y)$; P_x = Price of x ; P_y = Price of y & M = Income

Max $U = f(x, y)$ — (A)

s.t. $M = P_x X + P_y Y$ — (B)

This is a constrained maximisation problem, so we have to use Lagrangian method to solve the problem.

So, the Lagrangian function we have ①

$$L = f(x, y) + \lambda(M - P_x x - P_y y)$$

[where, λ = Lagrangian multiplier]

$$\frac{\partial L}{\partial x} = 0 \Rightarrow \frac{\partial f}{\partial x} - \lambda P_x = 0 \text{ — ② } \Rightarrow MU_x = \lambda P_x \Rightarrow \lambda = \frac{MU_x}{P_x}$$

$$\frac{\partial L}{\partial y} = 0 \Rightarrow \frac{\partial f}{\partial x} - \lambda P_y = 0 \text{ — ③ } \Rightarrow MU_y = \lambda P_y \Rightarrow \lambda = \frac{MU_y}{P_y}$$

$$\frac{\partial L}{\partial \lambda} = 0 \Rightarrow I - P_x X - P_y Y = 0 \text{ — ④}$$

equating 'λ', we get —

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

$$\Rightarrow \frac{MU_x}{MU_y} = \frac{P_x}{P_y} \quad \left[\because \frac{MU_x}{MU_y} = -\frac{dY}{dX} = MRS\right]$$

$$\boxed{MRS = -\frac{dY}{dX} = \frac{P_x}{P_y}} \rightarrow ⑤$$

Numerical example 1 :-

given, $U = f(x, y) = x^{3/4} y^{1/4}$

$P_x = $ Rs 6/unit

$P_y = $ Rs 3/unit

$M = $ Rs 120

Numerical problems 2:

given, $U = f(x, y)\ x^{3/4} y^{1/4}$

Price of x = P_x

" " y = P_y

money income = I

find out the demand function