$\frac{d\Psi x}{}$ $\frac{}{Py}$

Derivation of the equilibrium of the consumer:-

The consumer is equilibrium when he maximizes his utility, given income and the market prices. Two condition must be fulfilled for the consumer to be in equilibrium

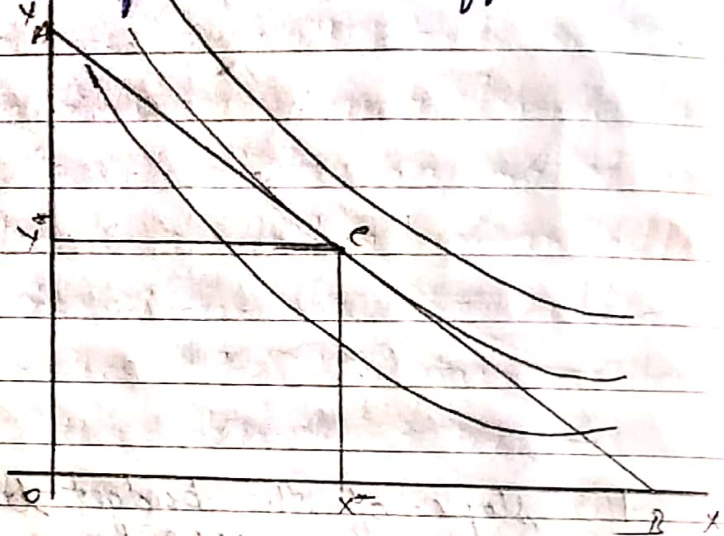
1) The MRS ~~xy~~ be equal to the ratio of market prices. $MRS_{xy} = \frac{MUx}{MUY} = \frac{Px}{Py}$

11) The indifference curve be convex to the origin. This condition is fulfilled by the axiom of diminishing MRS_{xy}. which states that the slope of the indifference curve decreases as we move along the curve form the left downward to right.

...2

Date ____

Graphical presentation of the equilibrium of consumer :- Given the I.D. map of the consumer and his budget line, the equilibrium is defined by the point of tangency of the budget line with the highest possible indifference curve



at the point (e) of tangency the slope of the budget line (P_x/P_y) and of the indifference curve ($MRS_{xy} = MU_x/MU_y$) are equal

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

at point e both the condition are fulfilled and the consumer maximis his utility by buying x^* and y^* of the two commodities.

Mathematical derivation of the equilibrium:

Maximize $U = f(q_1, q_2, \ldots, q_n)$

Subject to $\sum_{i=1}^{n} q_i P_i = q_1 P_1 + q_2 P_2 + \ldots + q_n P_n = Y$

Solution :- The composite function

$$\phi = U - \lambda(q_1 P_1 + q_2 P_2 + \ldots + q_n P_n - Y)$$

The first order condition the maximization of a function is equat to zero.

Differentiating ϕ with respect to $q_1 \ldots q_n$ and λ and equating to zero.

...3

$$\frac{\partial \phi}{\partial q_1} = \frac{\partial U}{\partial q_1} - \lambda(P_1) = 0 \quad \text{---} \quad (i)$$

$$\frac{\partial \phi}{\partial q_2} = \frac{\partial U}{\partial q_2} - \lambda(P_2) = 0 \quad \text{---} \quad (ii)$$

$$\vdots$$

$$\frac{\partial \phi}{\partial q_n} = \frac{\partial U}{\partial q_n} - \lambda(P_n) = 0 \quad \text{---} \quad (iii)$$

$$\frac{\partial \phi}{\partial \lambda} = -(q_1 P_1 + q_2 P_2 + \cdots + q_n P_n - Y) = 0 \quad \text{--} \quad (iv)$$

form these equation we obtain

$$\frac{\partial U}{\partial q_1} = \lambda P_1, \frac{\partial U}{\partial q_2} = \lambda P_2, \frac{\partial U}{\partial q_n} = \lambda P_n$$

Substituting and solving for λ

$$\lambda = \frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \cdots = \frac{MU_n}{P_n}$$

and if commodity x and commodity Y

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

we observe that the equilibrium condition are identical in the cardinalist approach and in indifference curve approach.

$$\frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \cdots = \frac{MU_n}{P_n}$$