NUMERICALS

1. Complete the following table:

Amount Consumed	1	2	3	4	5
Total Utility	50	90		140	150
Marginal Utility	50		30		

Sol. **Total Utility:** 50, 90, 120, 140, 150.

Marginal Utility: 50, 40, 30, 20, 10.

2. Ice cream sells for ₹ 20. Mohini who likes ice cream, has already consumed 4. Her marginal utility of one rupee is 4. Should she consume more ice cream or stop the consumption?

Sol. A consumer attains equilibrium when:

$$\frac{MU_X}{MU_M} = P_X$$

If a rupee worth of satisfaction to Mohini is 4, she must be getting 80 (= 20 × 4) units of satisfaction (or more) from the fourth ice cream. Otherwise, she would not buy it.

Assuming that Mohini gets 80 units of satisfaction from the fourth ice cream ($MU_X = 80$), we get

$$\frac{MU_X}{MU_M} = P_X = \frac{80}{4} = 20$$

Implying that the equilibrium has already been struck. Hence, Mohini should not consume more ice cream. However, if $MU_X > 80$, she will consume more ice cream and stop only when $MU_X = 80$.

3. Satish has ₹ 88 with him. He intended to purchase goods X and Y with his money. The market price of X and Y per unit is ₹ 8. The marginal utility schedule of good X and Y is given below. Find out how many units of X and Y should Satish purchase so that he will get maximum satisfaction?

Units of Commodity	MU of X	MU of Y
1	80	40
2	70	36
3	64	24
4	56	20
5	48	16
6	40	12
7	32	8
8	24	4
9	16	0
10	8	0

Sol. Equilibrium condition with respect to consumption of X and Y is that:

$$MU_X = MU_Y \text{ (when } P_X = P_Y = ₹\,8)$$

It occurs when Satish purchases 8 units of X and 3 units of Y.

$$MU_X = 24 \text{ (spending } 8 \times 8 = ₹\,64)$$

$$MU_Y = 24 \text{ (spending } 3 \times 8 = ₹\,24)$$

67. A consumer consumes only two goods X and Y both priced at ₹ 3 per unit. If the consumer chooses a combination of these two goods with marginal rate of substitution equal to 3, is the consumer in equilibrium? Give reasons. What will a rational consumer do in this situation? Explain. ***[CBSE Delhi 2015]***

Ans. Given, $P_X = ₹ 3$; $P_Y = ₹ 3$; MRS (marginal rate of substitution) = 3

The consumer attains equilibrium when:

$$MRS = \frac{P_X}{P_Y}$$

In the given question, the consumer is not in the equilibrium because here, $3 \neq \frac{3}{3}$, *i.e.*, MRS $> \frac{P_X}{P_Y}$.

On the assumption that $\frac{P_X}{P_Y}$ remains constant (and also, income of the consumer is constant) equilibrium can be struck only when MRS_{XY} starts falling and becomes equal to $\frac{P_X}{P_Y}$. This happens only when the consumer starts consuming more of X in place of Y. That is, he moves downward to the right along the IC. Convexity of the IC ensures that as the consumer moves downward to the right along his IC, MRS_{XY} tends to fall.

Briefly, when $MRS_{XY} > \frac{P_X}{P_Y}$, the consumer would react to this situation by substituting X for Y so that MRS_{XY} declines and becomes equal to price ratio.

.68. A consumer consumes only two goods X and Y whose prices are ₹ 4 and ₹ 5 per unit respectively. If the consumer chooses a combination of the two goods with marginal utility of X equal to 5 and that of Y equal to 4, is the consumer in equilibrium? Give reasons. What will a rational consumer do in this situation? Use utility analysis. *[CBSE Delhi 2015]*

Ans. Given, P_X = ₹ 4; P_Y = ₹ 5; MU_X = 5; MU_Y = 4

The consumer attains equilibrium when:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

In the given question, the consumer is not in the equilibrium because here, $\frac{5}{4} \neq \frac{4}{5}$, *i.e.*, $\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$.

The consumer would react to this situation by increasing the consumption of Good-X in place of Good-Y, because rupee worth of satisfaction in case of X $\left(= \frac{MU_X}{P_X}\right)$ is greater than in case of Y $\left(= \frac{MU_Y}{P_Y}\right)$. As consumption of X is increased, MU_X would start declining. Likewise, fall in the consumption of Y would cause a rise in MU_Y. The process of substituting X for Y would continue till $\frac{MU_X}{P_X}$ (rupee worth of MU_X) and $\frac{MU_Y}{P_Y}$ (rupee worth of MU_Y) are equal and the equilibrium is achieved.