Consumer Behaviour

1. Draw indifference curves that represents the following individuals' preferences for hamburgers(h) and soft drinks (s). Indicate the direction in which the individuals' satisfaction (or utility) is increasing.

   (a) Raman has convex indifference curves and dislikes both hamburgers and soft drinks.

   (b) Rita loves hamburgers and dislikes soft drink, but insists on consuming exactly one soft drink for every two hamburgers that she eats.

   (c) Sarika like hamburgers, but neither likes nor dislikes soft drinks.

2. Consumers in Chandigarh pay twice as much for grapes as they do for mangoes. However, grapes and magoes are the same price in Kolhapur. Consumers buy both the goods in both the cities. If consumers in both cities maximize utility, will the marginal rate of substitution of mangoes for grapes be the same for consumers in both cities? If not, which will be higher? Why?

3. Explain why MRS between two goods must equal the ratio of the price of the goods for the consumer to achieve maximum satisfaction.

4. Tara has monthly income of Rs 100 that she allocates among two goods: meat (M) and potatoes (P).

   (a) Suppose meat costs Rs 50 per kilogram and potatoes Rs 25 per kg. Draw her budget constraint.

   (b) Suppose that her utility function is given by the equation $U(M, P) = 2M + P$. What combination of meat and potatoes should she buy to maximize her utility?

   (c) Tara's supermarket has a special promotion. if she buys 20 kilogram of potatoes (at rs 25 kg), she gets the next 10 kilogram for free. This offer applies only to the first 20 kilogram pounds she buys. All potatoes in excess of the first 20 kilogram (excluding bonus potatoes) are still Rs 25 per kg. draw her budget constraint.

   (d) An outbreak of potato rot raises the price of potatoes to Rs 40per kg. The supermarket ends its promotion. what does her budget constraint look like now? what combination of meat and potatoes maximizes her utility?

5. Explain whether the following statements are true or false.

   (a) The marginal rate of substitution diminishes as an individual moves downward along the demand curve.

   (b) Engels curves always slope upward.(Engels curve is locus of the utility maximization points when the income is increased keeping the price constant).

6. Suppose utility function is $U(x, y) = \sqrt{x} + \sqrt{y}$, where X is consumption of candy bars with price $P_x = Rs\ 1$ and y is consumption of espressos with $P_y = Rs\ 3$.

   (a) Derive demand function for candy bar and espresso.

   (b) Assume that income is Rs 100. How many candy bars and how many espressos will she consume?

   (c) What is the marginal utility of income?

7. Suppose you are in charge of a toll bridge that costs essentially nothing to operate. The demand for bridge crossing Q is given by $P = 15 - (\frac{1}{2})Q$.

   (a) Draw the demand curve for bridge crossing.

   (b) How many people would cross the bridge if there is no toll?

   (c) What is the loss of consumer associated with the bridge toll of Rs 5?

   (d) The toll bridge operator is considering an increase in the toll to Rs 7. At this higher price, how many people would cross the bridge? Would the toll bridge revenue increase or decrease? What does your answer tell you about the elasticity of demand?

   (e) Find the lost consumer surplus associated with the increase in the price of the toll from rs 5 to Rs 7.

Answer

1. (a) Figure 1.
   (b) Figure 2.
   (c) Figure 3.

2. Price of grapes (G) is twice the price of mangoes (M) in Chandigarh. Consumers in Chandigarh maximizes their utility so $\frac{Mu_G}{Mu_M} = \frac{p_G}{p_M} = 2$. In Kolhapur it is $\frac{Mu_G}{Mu_M} = \frac{p_G}{p_M} = 1$. The MRS is higher in Chandigarh. Because the price of grapes is twice the price of mangoes in Chandigarh. In Kolhapur, the price of mangoes is same as grapes.

3. Suppose $\frac{Mu_x}{Mu_y} > \frac{p_x}{p_y}$, in this situation if consumer increases the consumption of good x and reduces the consumption of good y, his utility increases. It is shown in figure 4. When consumption of good x increases. The marginal utility from good x decreases and marginal utility from good y increases because its consumption is decreasing. If we keep on increasing the consumption of good x and decreasing the consumption of good y, $\frac{Mu_x}{Mu_y}$ keeps on decreasing and finally $\frac{Mu_x}{Mu_y} = \frac{p_x}{p_y}$. Now if we further increase consumption of x and decrease y then $\frac{Mu_x}{Mu_y} < \frac{p_x}{p_y}$. In this situation if consumer decreases the consumption of good x and increases the consumption of good y, his utility increases. Therefore, $\frac{Mu_x}{Mu_y} = \frac{p_x}{p_y}$ when utility is at maximum.

4. (a) The budget line is shown as black line in figure 5. The maximum Meat (M) Tara can buy is 20 kg. The maximum potatoes (P) Tara can buy is 40.
   (b) Utility function of Tara is $U(M, P) = 2M + P$. Indifference curves are straight lines, meat and potatoes are perfect substitute for Tara. Given the budget constraint, the indifference curve that maximizes the utility is the one same as the budget constraint. Any indifference below the budget line implies that there are bundles those can be bought and utility can be increased. Any indifference curve above budget line implies that bundles on the indifference curves are not affordable, so not maximizes utility. The slope of budget line is same as the slope of the indifference curve, so all the bundles of the budget line maximizes utility. It is shown in figure 5, red line (indifference curve) merges with the black line (budget line).
   (c) It is shown in figure 6, the outer boundary is the budget constraint when the special promotion is there.
   (d) It is shown in figure 7. The bundle that maximizes utility of Tara is spending all the money on meat and nothing on potatoes that 20 kgs of meat and zero kg of potato.

5. (a) In figure 8, the derivation of demand function of good x has been shown. As we move downward in the demand function, the price of the good x falls and price of good y is fixed. So the $\frac{p_x}{p_y}$ ratio falls. At each point of the demand function $\frac{Mu_x}{Mu_y} = \frac{p_x}{p_y}$. So the MRS is falling. This statement is true.
   (b) This statement is not true. The Engel curve for Giffen good is downward sloping. Engel curve is not always upward sloping

6. (a) The utility maximization problem subject to budget constraint is,
   Max $U(X, Y) = \sqrt{X} + \sqrt{Y}$
   subject to $1.X + 3.Y = M$, where I is the income.
   The Lagrange of the above problem is,
   $L = \sqrt{X} + \sqrt{Y} + \lambda[I - X - 3Y]$.
   At the maximum point, we have:
   $\frac{\partial L}{\partial X} = \frac{1}{2\sqrt{X}} - \lambda = 0$
   $\frac{\partial L}{\partial Y} = \frac{1}{2\sqrt{Y}} - \lambda 3 = 0$
   $\frac{\partial L}{\partial \lambda} = I - X - 3Y = 0$
   From the first two equation we get,
   $\frac{Y}{X} = \frac{1}{9}$, substituting it in the third equation we get $Y = \frac{I}{12}$, $X = \frac{I}{3}$.
   (b) If $I = 100$, $X = \frac{100}{3}$, $Y = \frac{100}{12}$.
   (c) Marginal utility of income at the optimum bundle is $\frac{1}{2\sqrt{X}} = \lambda$, $\lambda = \frac{\sqrt{3}}{20}$

7. (a) Figure 9
   (b) 30
   (c) Consumer surplus is $\int_0^{20}(15 - \frac{x}{2})dx$, $(15 - \frac{x}{2})$ is the inverse demand function, $Q = 20$, $atP = 5$. Solution to the above problem is 200. When $P = 0$, $Q = 30$. The consumer surplus is 225 when $P = 0$. The loss of consumer surplus is 25.

(d) $Q = 16$ at $4P = 7$. The toll bridge revenue increases. We know total revenue is $P.Q$. $\frac{dP.Q}{dp} = Q + P\frac{dQ}{dp} = Q(1 - (elasticity\ of\ demand))$. We have $\frac{dP.Q}{dp} > 0$ so elasticity is inelastic.

(e) When $P = 7$, consumer surplus is 176. The loss in consumer surplus is 24.

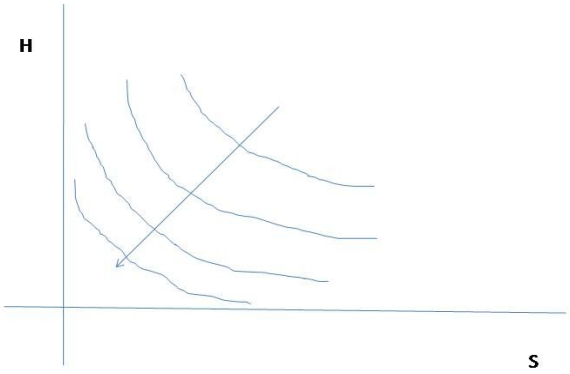

Figure 1

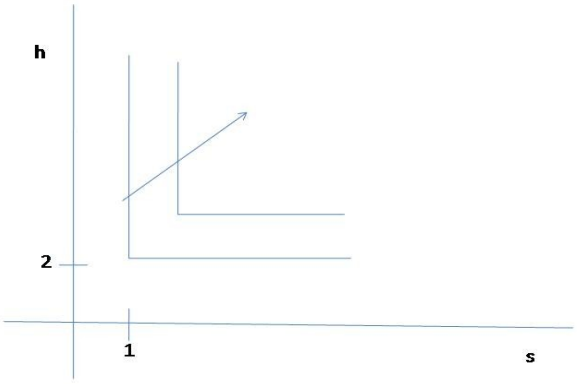

Figure 2

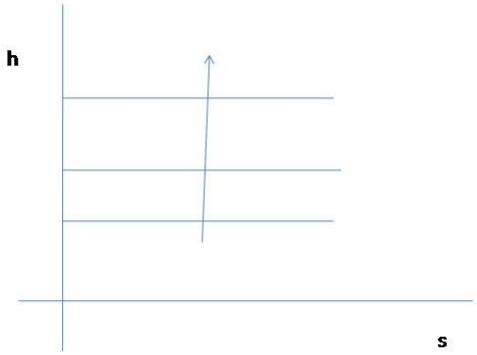

Figure 3

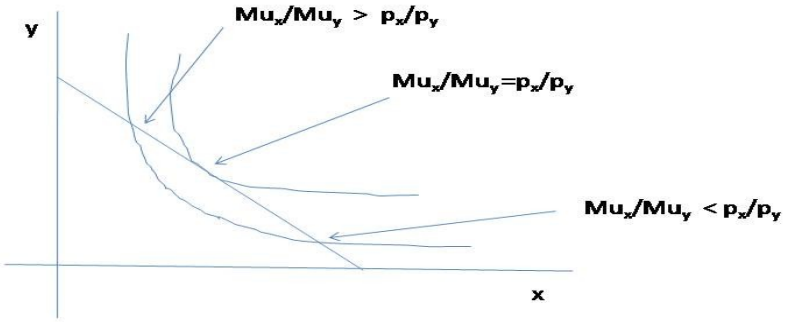

Figure 4

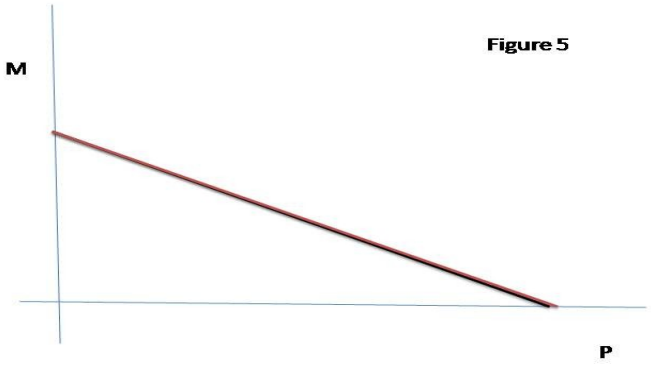

Figure 5

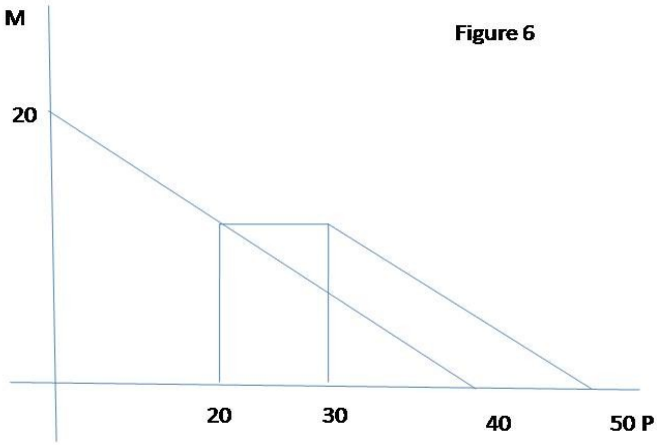

Figure 6

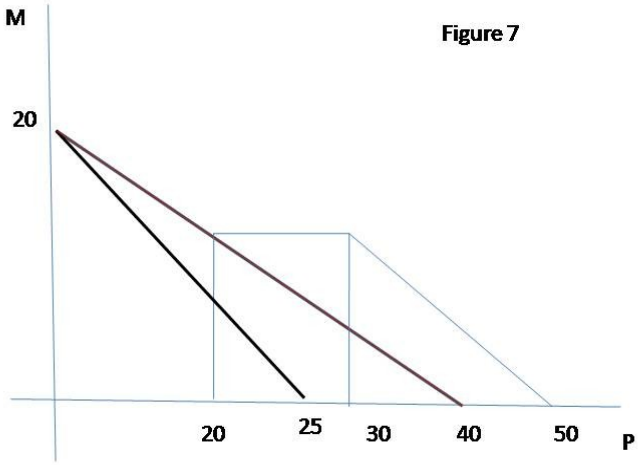

Figure 7

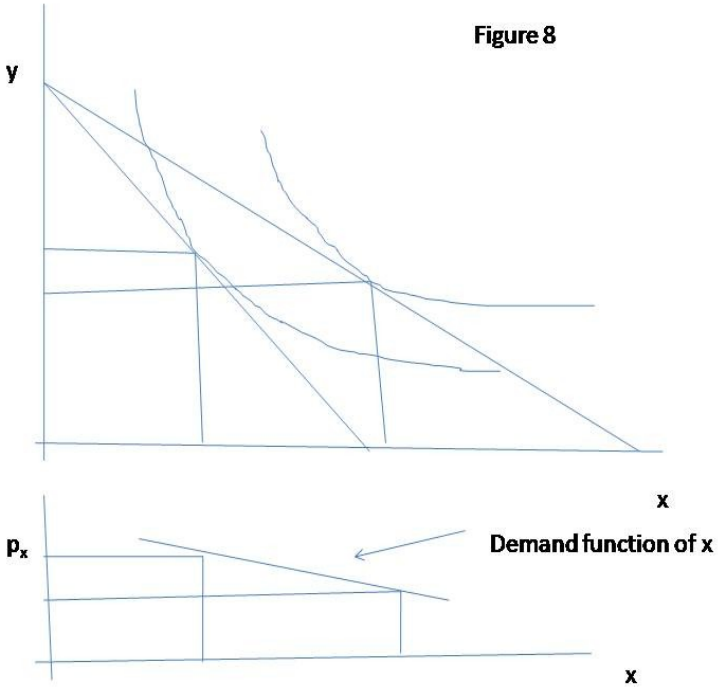

Figure 8

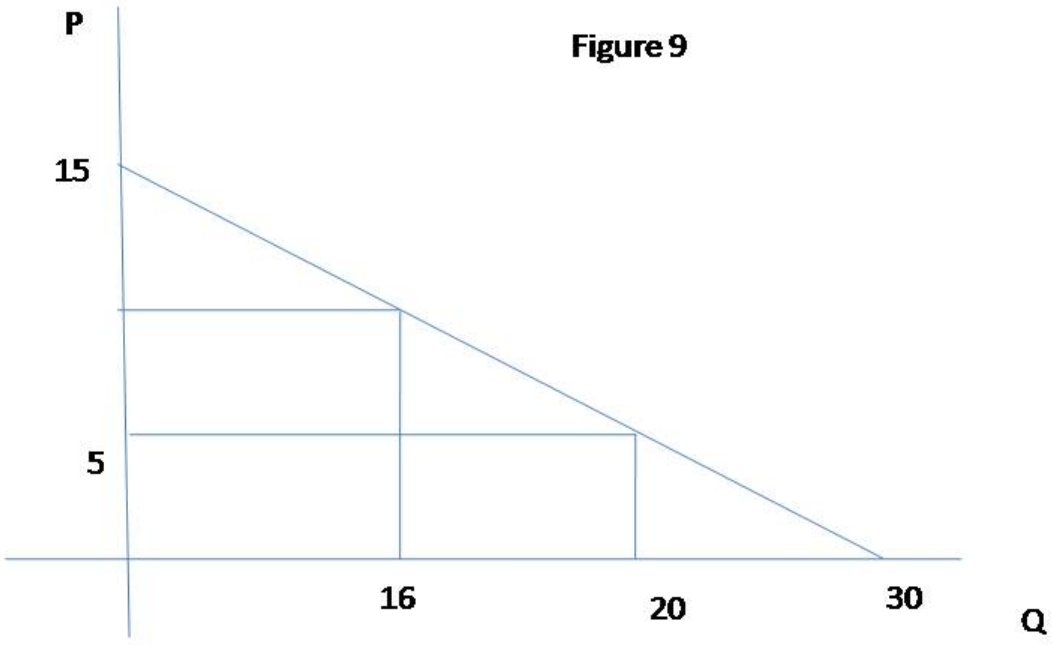

Figure 9