

x_2) utility function is given by $U = U(x_1, x_2)$ and it depends on taste and preferences of the consumer, which is specified by axioms given below:

1) **Axiom of reflexiveness:** Consumer's choice is reflexive.

Implication: Weak preference relation is denoted by 'R'. Suppose there are two goods x_1 and x_2 and suppose x_1 is weakly preferred to x_2 i.e., $x_1 R x_2$ which implies that either x_1 is strictly preferred over x_2 (it is denoted by $x_1 P x_2$) or x_1 is indifference to x_2 (it is denoted by $x_1 I x_2$), where 'P' and 'I' implies strict preference relation and indifference respectively.

The set constituted by all commodity bundles or vector is known as commodity set (X). Any one commodity bundle is denoted by 'x' is weakly preferred (i.e., either strictly preferred or indifferent) over any other commodity bundle (i.e., in respect to 'x'). Therefore, we have $x R x$.

Clearly, any one commodity bundle may be indifferent to another commodity bundle i.e., there is a possibility of indifference or same level of utility between the commodity bundles.

None of the commodity bundles are not preferred i.e., consumer can choose any commodity bundle. So choice set of this consumer is specified by the commodity set 'X'.

2) **Axiom of completeness:** Consumer's choice is complete.

Implication: Since consumer is rational, she must have a unique preference relation. That means the consumer choice is either $x_1 R x_2$ or $x_2 R x_1$. Alternatively, consumer's choice is consistent or comparable. For unique preference relation, consumer choice must be transitive, where transitivity implies that if $x_1 R x_2$ and $x_2 R x_3$ then $x_1 R x_3$, where x_3 is another commodity.

3) **Axiom of continuity:** Consumer's preference relation (R) is continuous.

1) **Axiom of non-satiation:** Consumer's choice is non-satiated in all goods.

Implication: Non-satiation means larger the consumption of a good leads to larger satisfaction or utility or lower the consumption lower is the satisfaction or utility. Non-satiation of all goods (which means "goods are good" or "more is better") means any commodity bundle 'A' is preferred over another commodity bundle 'B' only if bundle 'A' consists larger quantity of at least one good and no less quantity of any other goods. Notationally if $A \succ B$, then A is preferred over B or $A \succ B$ where B is any other commodity bundle.

2) **Axiom of convexity:** Consumer choice is such that indifference curve is strictly convex to the origin (i.e., utility function is quasi-concave).

3) **Axiom of selfishness:** Consumer choice is selfish.

Implication: Consumer's choice is self-guided. It is not influenced by any other consumer.

1.5.1 Concept of Preference, Utility Function and Indifference Curve

Consumer preference ('R') specified by the above axioms can be represented by a function where total utility ('U') depends on quantity consumption (x_1 , x_2), which satisfied all other axioms. The function $U = U(x_1, x_2)$ is known as