

BEC2111 Microeconomics 2

Lecture Note

Consumer Behavior

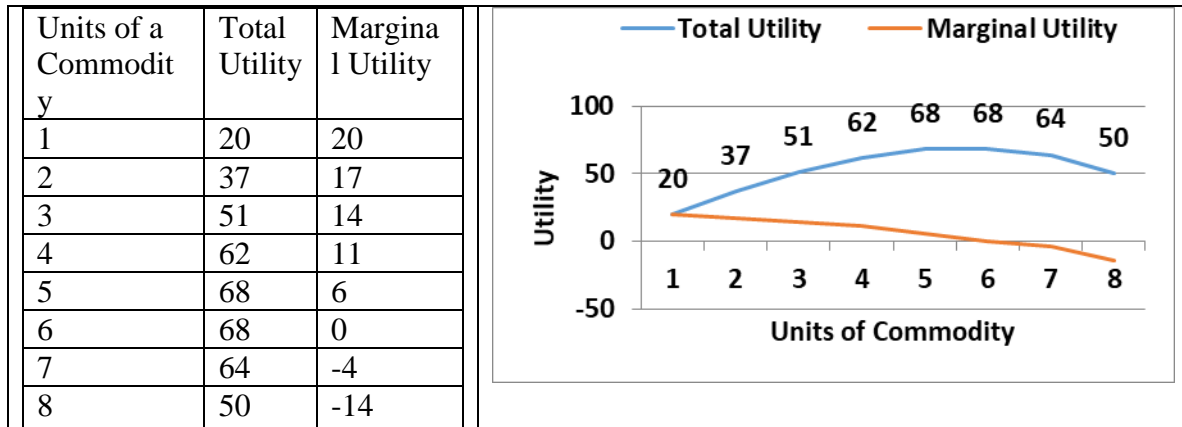
Introduction:

- ✚ *Demand* is determined by *many factors* (own price, consumers' income, prices of other commodities, consumers' tastes, income distribution, total population, consumers' wealth, credit availability, government policy, past level of demand, and past level of income, etc) simultaneously.
- ✚ The traditional theory of demand examines only the *final consumers' demand for durables and non- durables*. It does not deal with the demand for investment goods, nor with the demand for intermediate products.
- ✚ *Total demand* includes *final demand* and *intermediate demand*.
- ✚ *Final demand* is subdivided into *consumers' demand* and *demand for investment goods*.
- ✚ Traditional theory of demand deals only with *consumers' demand*, which is only a fraction of the total demand in the economy as a whole.

Meaning of Utility and Marginal Utility:

- ✚ **Utility:** Utility means want satisfying power of a commodity.
- ✚ **Types of utility:** Total utility and marginal utility
- ✚ **Total utility:** The sum of total satisfaction which a consumer receives by consuming various units of the same commodity.
- ✚ **Marginal Utility:** It refers as utility of every additional unit of the consumed or it can be defined as a change in total utility resulting from a one unit change in the consumption of a commodity at particular point of time.
- ✚ Total utility is the sum of marginal utility.
- ✚
$$MU_n = TU_n - TU_{n-1}$$

Example of Total Utility and Marginal Utility



Relationship between Total Utility and Marginal Utility:

Total Utility	Marginal Utility
As we consume more goods total utility increases but diminishing rate.	As we consume more goods marginal utility diminishes.
When total utility reaches at maximum	Marginal utility becomes zero.
When total utility declines	Marginal utility becomes negative.

Theory of Consumer Behaviour:

- Consumer is assumed to be rational. Given his income and the market prices of the various commodities, he plans the spending of his income so as to attain the highest possible satisfaction or utility. This is the *axiom of utility maximization*.
- In the traditional theory it is assumed that the consumer has full knowledge of all the available commodities.
- There are two basic approaches to the problem of comparison of utilities: the *cardinalist approach* and the *ordinalist approach*.

Cardinalist Approach:

- The *cardinalist school* postulated that utility can be measured.

- ✚ *The concept of subjective, measurable utility is attributed to Gossen (1854), Jevons (1871) and Walras (1874). Marshall (1890) also assumed independent and additive utilities, but his position on utility is not clear in several aspects.*
- ✚ Some economists have suggested that utility can be measured in monetary units, by the amount of money the consumer is willing to sacrifice for another unit of a commodity.
- ✚ Others suggested the measurement of utility in subjective units, called *utils* (Walras has introduced).
- ✚ The main cardinal theories are law of diminishing marginal utility (Gossen's first law); and the law of equi- marginal utility (Gossen's second law).

Ordinal Approach:

- ✚ The ***ordinalist school*** postulated that utility is not measurable, but is an ordinal magnitude. The consumer can give *rank* the various baskets of goods according to the satisfaction that each bundle gives him. He must be able to determine his *order of preference* among the different bundles of goods.
- ✚ The main economists of ordinal approach are Pareto, W. E. Johnson, E. E. Slutsky, J. R. Hicks and R.G.D. Allen.
- ✚ The main ordinal theories are the *indifference curves approach* and the *revealed preference hypothesis*.

The Cardinal Utility Approach

Assumptions:

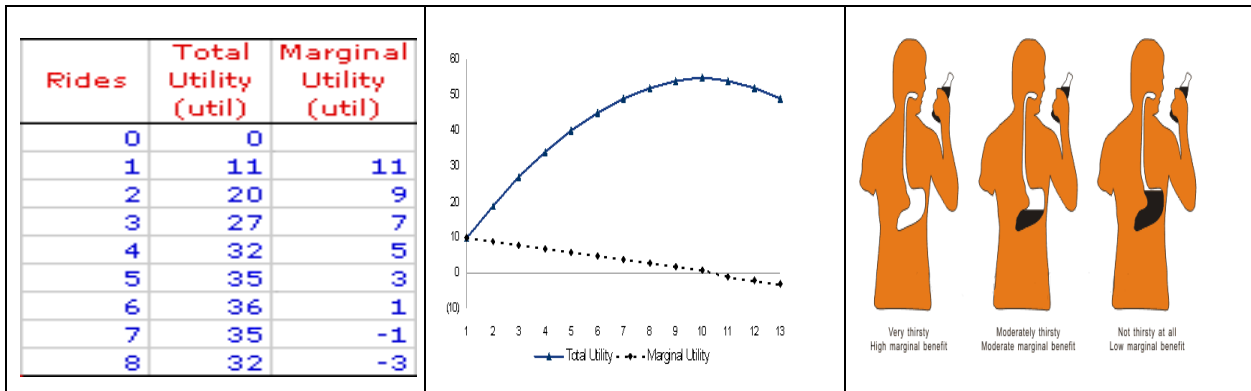
- ✚ Rationality;
- ✚ Cardinal utility;
- ✚ Constant marginal utility of money; and
- ✚ Diminishing marginal utility.

Laws of Cardinal Marginal Utility Analysis:

1. **Law of Diminishing Marginal Utility (Gossen's First Law); and**
2. **Principle of Equi- Marginal Utility (Gossen's Second Law).**

Law of Diminishing Marginal Utility:

The Law of diminishing marginal utility states that as the consumer consumes more of a commodity, the utility of every additional unit (MU) consumed diminishes.



Assumptions:



Commodities are homogeneous;



There is no gap between consumption of different units;



Every consumer wants to maximize utility;



The taste and preferences of the consumer are remains the same during the period of the consumption;



Marginal utility of money remains the same.

Principle of Equi- Marginal Utility (Consumer Equilibrium):

The principle of equi- marginal utility states that the consumer will distribute his money income in such a way that the utility derived from the last *Saudi Riyal* spent on each good is equal. *In other words* the consumer is in equilibrium position when marginal utility of money spent on each good is same.

Equilibrium of the Consumer:



In case of Single Commodity: Under the condition of *single commodity (x)* the consumer is in equilibrium when the marginal utility of good x is equal to price of x. That is,

$$MU_x = P_x$$

If $MU_x > P_x$; the consumer can increase his welfare or satisfaction by purchasing more units of x.

If $MU_x < P_x$; the consumer can increase his total satisfaction by cutting down the quantity of x.

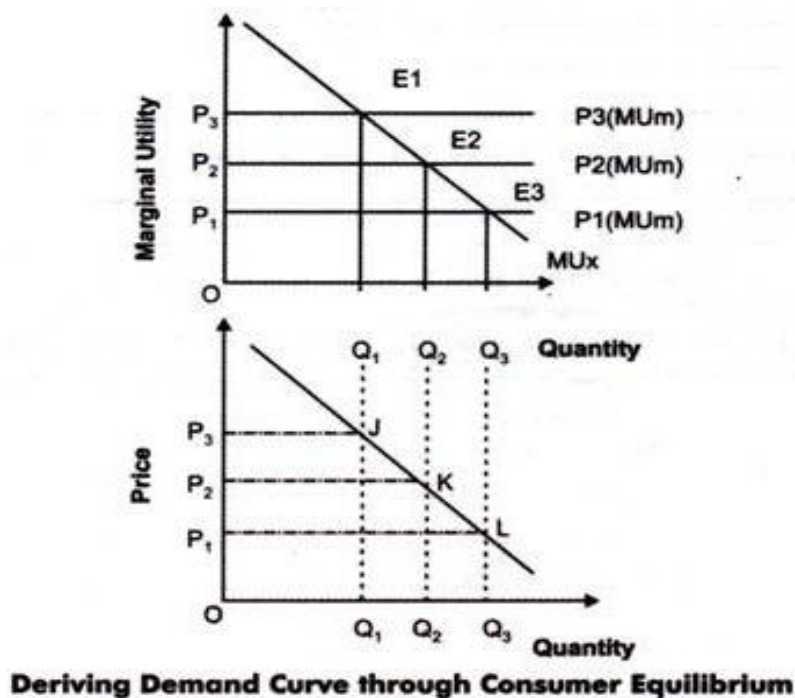


In case of More Commodity: If there are *more commodities*, the condition for equilibrium of the consumer is the equality of the ratios of the marginal utilities of the individual commodities to their prices. That is,

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \dots\dots\dots = \frac{MU_n}{P_n} = \lambda$$

Where λ denotes the marginal utility of the last rupee spent on each good.

Derivation of the Demand Curve:



Example: Let the price of goods x and y be SR 2 and SR 3 respectively and he has SR 24 to spend on the two goods. He gets marginal utilities from the two goods x and y which have been given in the following table. How much quantity of two goods the consumer has to purchase in given income so that he can get maximum satisfaction?

Units	MU _x	MU _y
1	20	24
2	18	21

3	16	18
4	14	15
5	12	9
6	10	3

Solution: Since $P_x = \text{SR } 2$; $P_y = \text{SR } 3$ and his Income = SR 24.

The condition for consumer's equilibrium is-

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} \text{ for two goods x and y. So we calculate } \frac{MU_x}{P_x} \text{ and } \frac{MU_y}{P_y} \text{ in the following}$$

table-

Units	$\frac{MU_x}{P_x}$	$\frac{MU_y}{P_y}$
1	$20/2 = 10$	$24/3 = 8$
2	$18/2 = 9$	$21/3 = 7$
3	$16/2 = 8$	$18/3 = 6$
4	$14/2 = 7$	$15/3 = 5$
5	$12/2 = 6$	$9/3 = 3$
6	$10/2 = 5$	$3/3 = 1$

By looking at the above table, it will become clear that the equilibrium condition in case of two goods ($\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$) satisfied at different units. Since consumer has to spend SR 24 on the two goods. He will be in equilibrium when he will buy 6 units of X and 4 units of Y so that his total income spent ($6*2 + 4*3 = 24$) on the two goods will exhaust and gets maximum satisfaction.

Criticism:

1. The satisfaction derived from various commodities cannot be measured objectively;
2. Constant marginal utility of money is also not constant. As income increases the marginal utility of money changes. Thus money cannot be used as measuring-rod since its own utility changes;
3. The axiom of diminishing marginal utility has been established from introspection, it is a psychological law which must be taken for granted.

Ordinal Utility Approach: Indifference Curve Analysis- I



The cardinal approach has been severely criticised for its assumptions. On this background F. Y. Edgeworth (1881), Vilfredo Pareto (1906), E. E. Slutsky (1915) derived consumer's equilibrium with the help of indifference curves.



Ultimately J. R. Hicks and R.G.D. Allen presented a scientific treatment to the consumer theory on the basis of ordinal utility, graphically represented by indifference curves.

Indifference Curve:



It shows various combinations of the two goods which give equal satisfaction or utility to the consumer.



An indifference curve is the locus of points which yield the same utility (level of satisfaction) to the consumer, so that he is indifferent as to the particular combination he consumes.



Combinations of goods situated on an indifference curve yield the same utility.

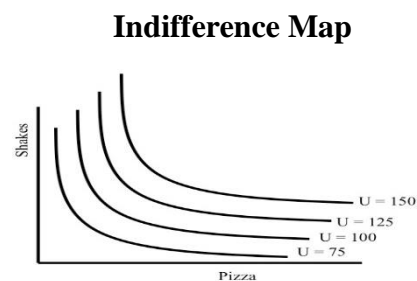
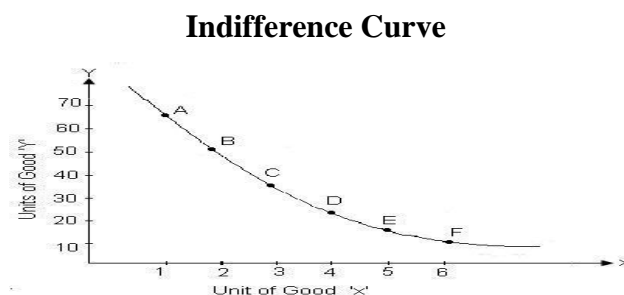


Combinations of goods lying on a higher indifference curve yield higher level of satisfaction and are preferred.

Indifference map:



An indifference map shows all the indifference curves which rank the preferences of the consumer.



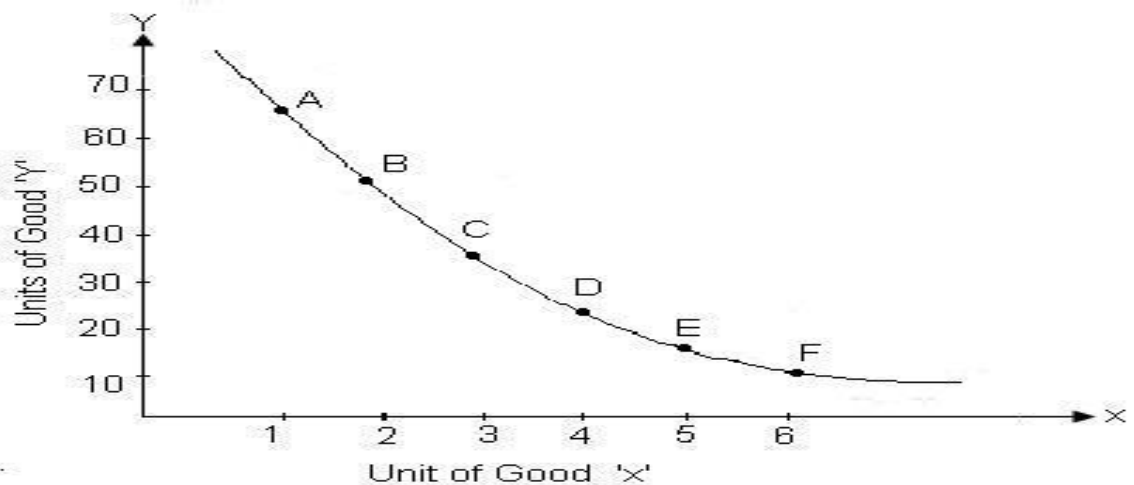
The indifference curve theory is based on these assumptions:

1. Rationality;
2. Ordinality;

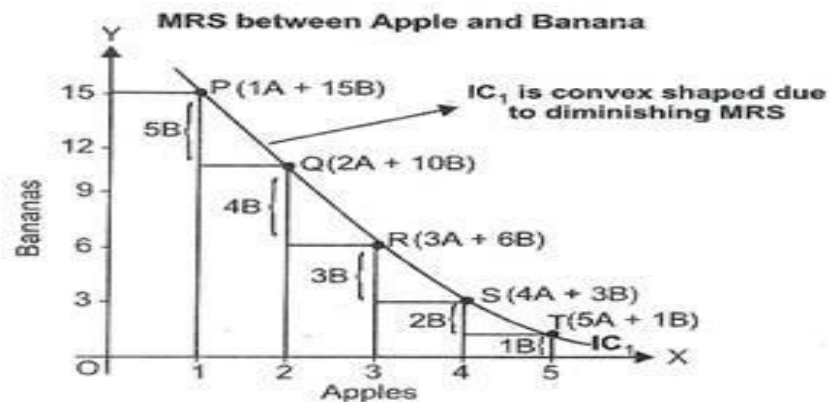
3. Diminishing Marginal Rate of Substitution;
4. Consistency and transitivity of choice;

Properties/ features of the indifference curves:

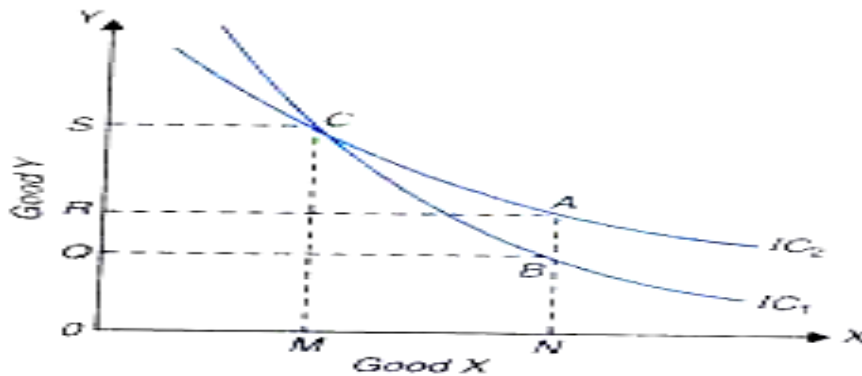
1. *Downward sloping to the right* (an indifference curve has a negative slope, which denotes that if the quantity of one commodity (y) decreases, the quantity of the other (x) must increase, if the consumer is to stay on the same level of satisfaction).



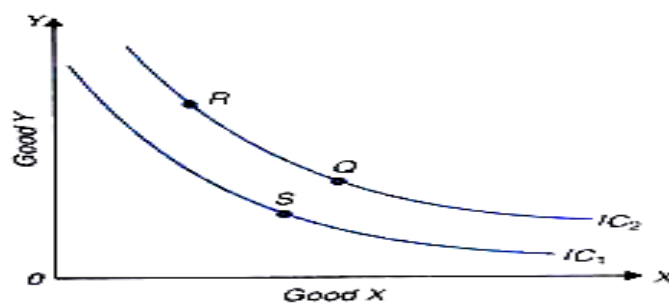
2. *Indifference curves are convex to the origin.* It means the slope of an indifference curve (marginal rate of substitution of X for Y or MRS_{XY}) decreases. This implies that the commodities can substitute one another, but are not perfect substitutes. If the commodities are perfect substitutes the indifference curve becomes a straight line with negative slope. If the commodities are complements the indifference curve takes the shape of a right angle.



3. Indifference curves *cannot intersect/cut* each other.



4. *A higher indifference curve represents a higher level of satisfaction.*



Marginal Rate of Substitution (MRS):



The negative slope of an indifference curve at any point is called the marginal rate of substitution of the two commodities, x and y, and is given by the slope of the tangent at that point:

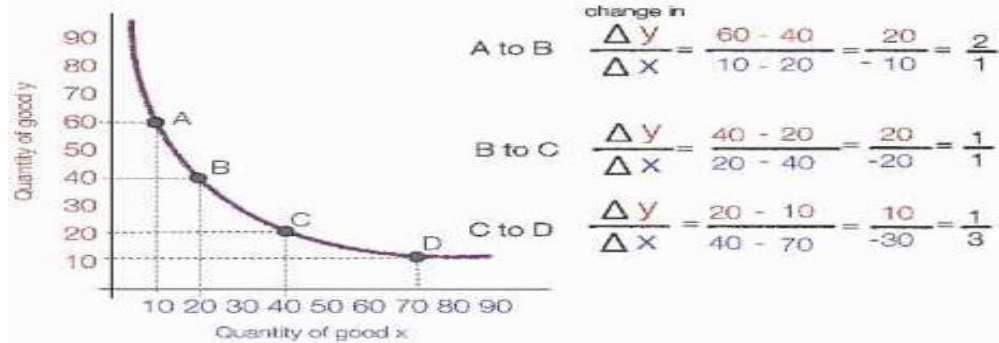
$$\text{Slope of indifference curve} = (-) \frac{dy}{dx} = \text{MRS}_{x,y} = \frac{MU_x}{MU_y}$$



The marginal rate of substitution of x for y is defined as the number of units of commodity y that must be given up in exchange for an extra unit of commodity x so that the consumer maintains the same level of satisfaction.

Indifference Curves

Marginal Rate of Substitution



Budget Line (price- income line, outlay line, expenditure line, etc):



The budget line shows all those combinations of two goods which consumer can buy by spending his money income on two goods at their given prices.

Budget line equation:

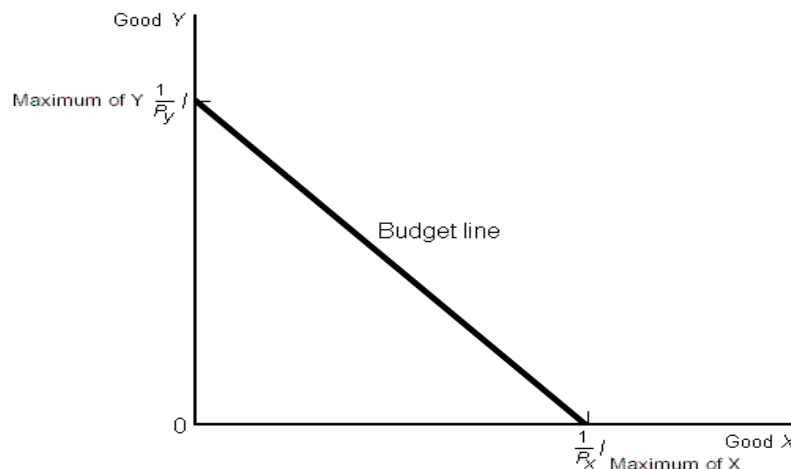


Income = Price of X commodity \times Quantity of commodity X + Price of Y commodity \times Quantity of commodity Y

$$\text{Or, } Y = P_x X + P_y Y$$



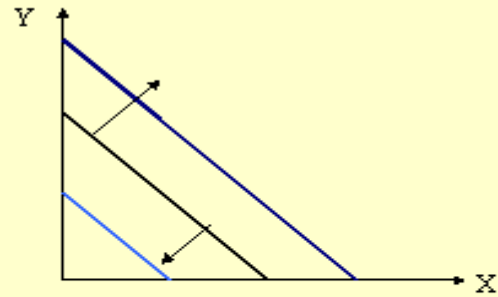
The Slope of the Budget line = $\frac{P_x}{P_y}$



Changes in the Budget Line

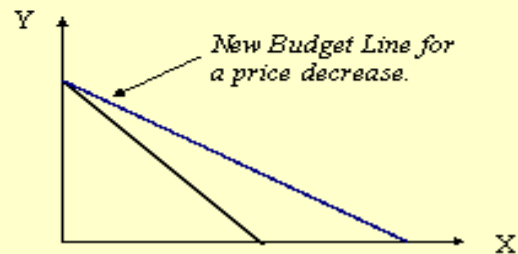
- **Changes in Income**

- Increases lead to a parallel, outward shift in the budget line.
- Decreases lead to a parallel, downward shift.



- **Changes in Price**

- A decrease in the price of good X rotates the budget line counter-clockwise.
- An increase rotates the budget line clockwise.



Equilibrium of the Consumer:

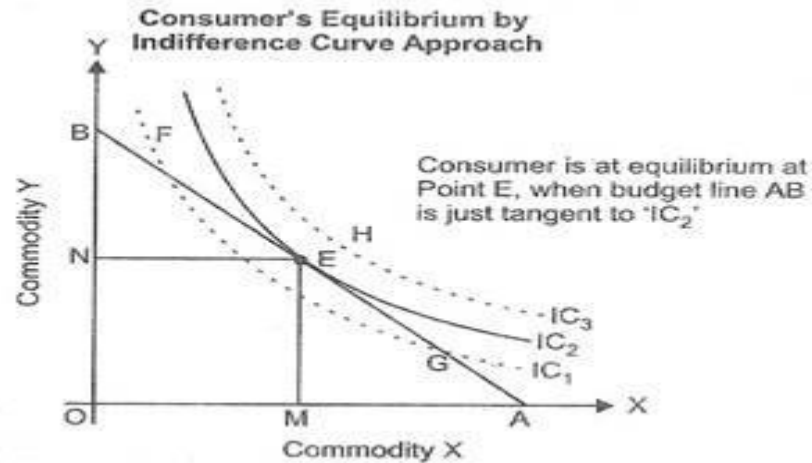


The consumer is in equilibrium when he maximizes his utility, given his income and the market prices.



Two conditions must be fulfilled for the consumer to be in equilibrium:

1. A given budget line must be tangent to an indifference curve, or marginal rate of substitution of X for Y (MRS_{XY}) must be equal to the price ratio of the two goods $\frac{P_x}{P_y}$. That is, $MRS_{XY} = \frac{MU_x}{MU_y} = \frac{P_x}{P_y}$ (necessary condition).
2. The indifference curve must be convex to the origin at the point of tangency or marginal rate of substitution of X for Y must be diminishing (sufficient condition).



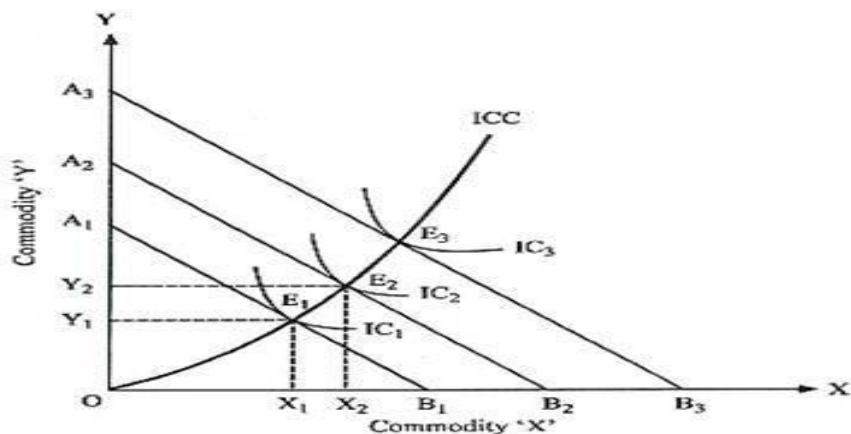
Elasticity of Substitution (e_s):

- The ease with which one good can be substituted for the other is called elasticity of substitution. It is defined as the proportionate change in the ratio between the two goods divided by the proportionate change in their MRS. That is:

$$e_s = \frac{\% \text{ change in } Y/X}{\% \text{ change in } MRS_{xy}} = \frac{\Delta(Y/X)}{\Delta MRS_{xy}} * \frac{MRS_{xy}}{Y/X}$$

Income- Consumption Curve (ICC):

- It is defined as the locus of points of consumer's equilibrium resulting when only the income is changed. It shows the effect of a change in the money income of the consumer on the quantity of the goods bought, *ceteris paribus*.
- At each point of ICC slope of indifference curve is equal to slope of budget line.



Normal goods: Goods for which changes in consumption are positively related to changes in income are said to be *normal* or *superior* goods.

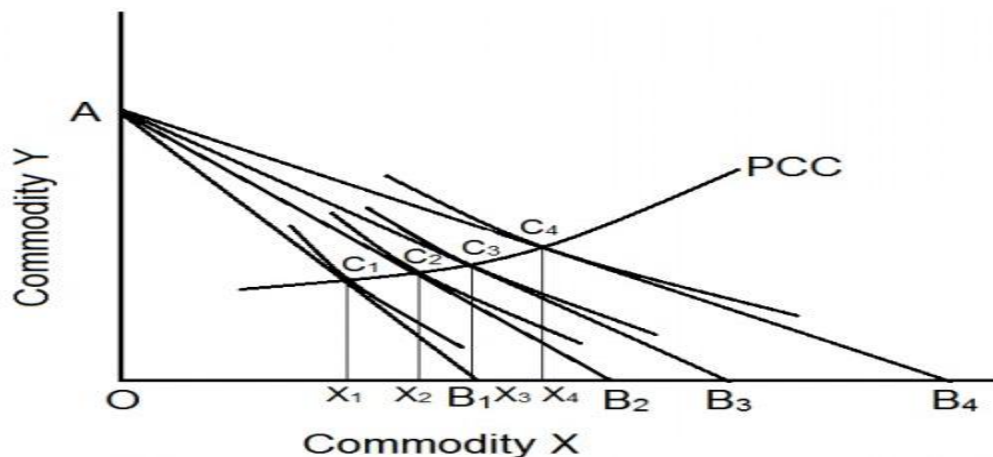
Inferior goods: In case of inferior goods, consumption falls with increase in income.

Engel's Curve:

- ✚ Engel's curve shows the amount of a commodity that the consumer will purchase per unit of time at various levels of income.
- ✚ This curve was developed by German Statistician, Christian Lorenz Ernst Engel.
- ✚ These curves are derived from income-consumption curves.

Price Consumption Curve (PCC):

- ✚ It shows the effect of a change in price of a commodity on the quantity of it bought, *ceteris paribus*.
- ✚ It is defined as the locus of points of consumer's equilibrium resulting when only the price of good X (or the price of good Y) is changed.
- ✚ At each point of the PCC slope of indifference curve is equal to slope of budget line.
- ✚ PCC shows the price effect (PE).
- ✚ Price effect (PE) is split into substitution effect (SE) and income effect (IE). That is, $PE = SE + IE$.
- ✚ The shape of PCC depends upon the directions of SE and IE.



Price Effect (PE):

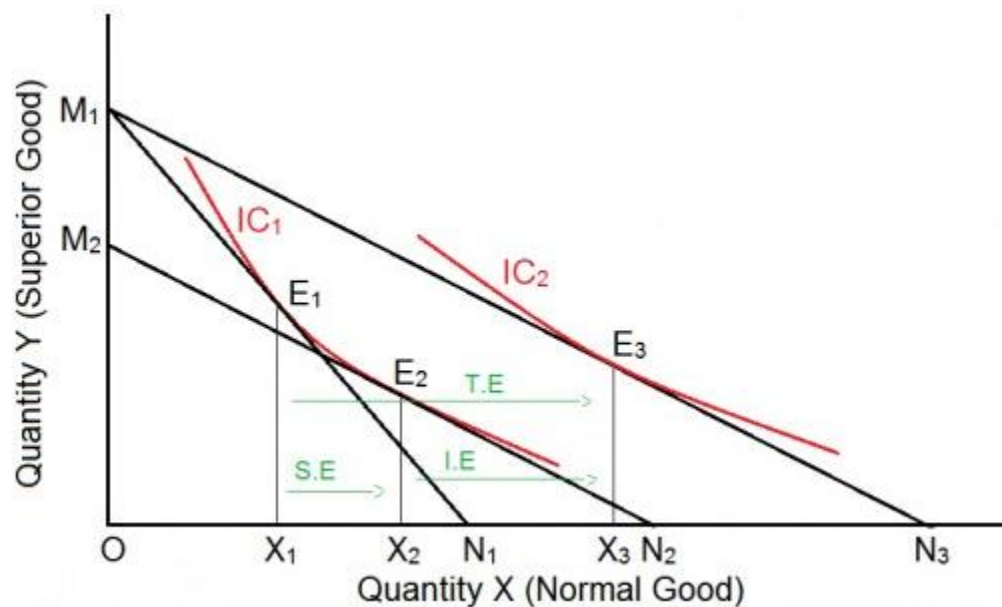
- ✚ A change in price of good X brings about a change in the quantity demanded of it, ceteris paribus. This change in the quantity demanded is called price effect.
- ✚ Price effect is split into two components:
 1. Substitution effect (SE); and
 2. Income effect (IE).

Substitution Effect (SE):

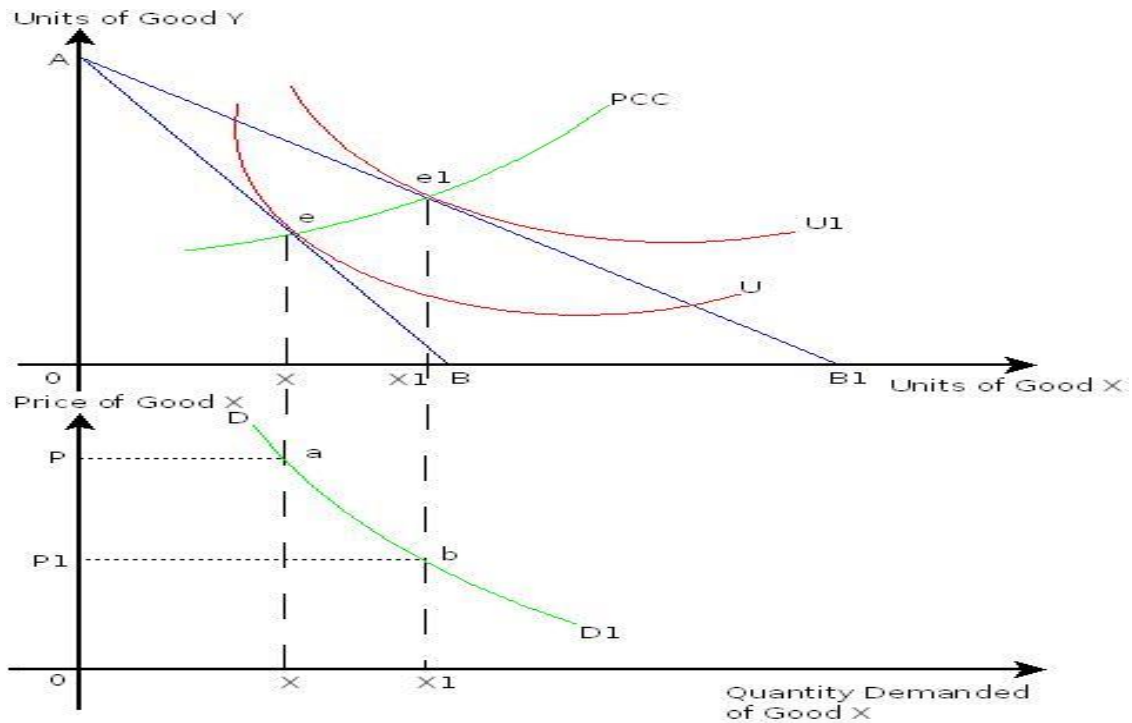
- ✚ The substitution effect is the increase in the quantity bought as the price of the commodity falls, after adjusting income so as to keep the real purchasing power of the consumer the same before.
- ✚ This adjustment in income is called compensating variation and is shown graphically by a parallel shift of the new budget line until it becomes tangent to the initial indifference curve.

Income Effect (IE):

- ✚ It states that a change in the price of a good will bring about a change in the real income (purchasing power) of the consumer, which in turn brings about a change in the quantity demanded of the good.
- ✚ The IE operates on the assumption that relative price of goods remains constant.



Derivation of the Demand Curve:

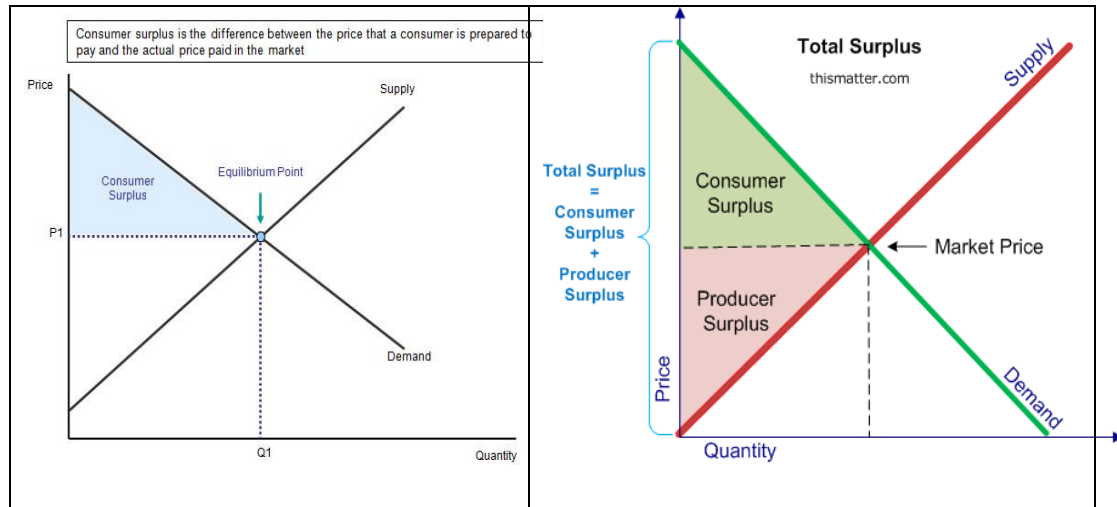


Consumer Surplus:

- ✚ The concept of consumer surplus has been given by **Marshall and Hicks**.
- ✚ Consumer surplus is defined as the net benefit or gain which a consumer enjoys by consuming one market basket instead of another.

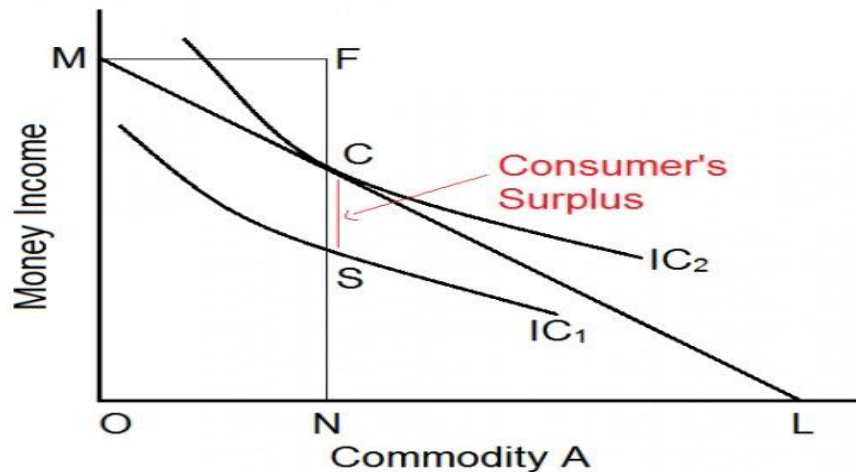
Marshallian Consumer Surplus:

- ✚ The excess amount he was willing to pay but does not have to pay is called consumer surplus.
- ✚ It is based on the law of diminishing marginal utility.



Hicksian Consumer Surplus:

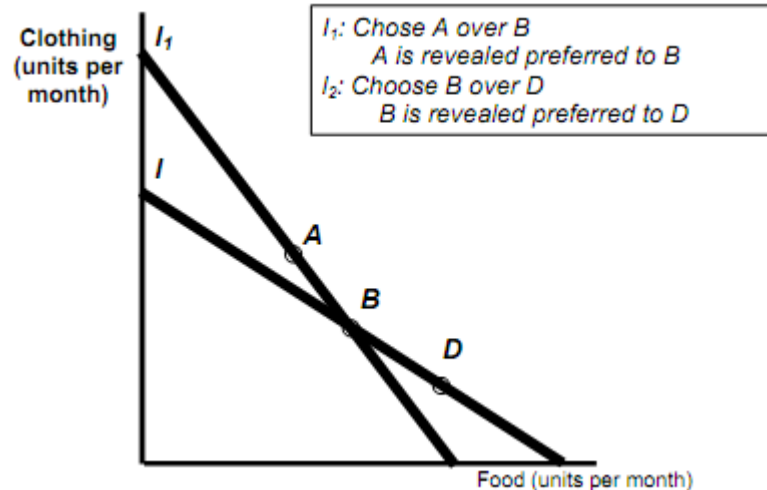
- ✚ Prof. J. R. Hicks modified the Marshallian consumer surplus which is equal to the area between the demand curve and the price line.
- ✚ Hicksian consumer surplus is equal to the vertical distance between the indifference curves.
- ✚ Hicksian consumer surplus is better as it is based on neither cardinal measurement of utility nor constant marginal utility of money.



Revealed Preference Theory

Meaning of Revealed Preference: When a consumer buys a commodity he reveals his preference for it.

- ✚ *Revealed preference theory* was developed by Paul A. Samuelson in 1938. This theory was developed as an alternative theory of demand based *on observed* market behaviour of consumers.
- ✚ Samuelson has criticised the marginal utility and indifference curve theories for studying consumers' behaviour, by describing them as *introspective*.
- ✚ Samuelson rejected the weak ordering hypothesis given by Hicks and built up his theory on strong ordering hypothesis.
- ✚ The revealed preference theory is also known as behaviouristic- ordinalist approach.
- ✚ It is behaviouristic because it relies on actual market behaviour; and ordinalist because it assumes utility as an ordinal concept.
- ✚ This theory derives the law of demand in a direct and simple manner.
- ✚ Samuelson deduced *the fundamental theorem of consumption* which states that demand for a commodity and its price are inversely related provided income elasticity of demand is positive.
- ✚ The revealed preference theory is based on **two axiom**:
 1. It states that from any set of alternatives, the consumer makes a choice; and
 2. It states that if A is chosen from a set of alternatives that includes B (which is different from A), then any set of alternating from which B is chosen must not contain A.

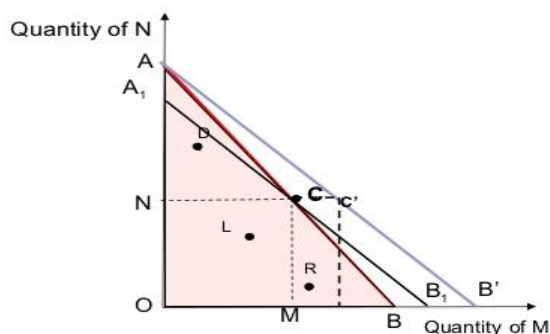


✚ **Assumption** of Revealed Preference Theory:

1. Rationality;
2. Consistency;
3. Transitivity; and
4. Axiom of revealed preference.

Revealed Preference Theory

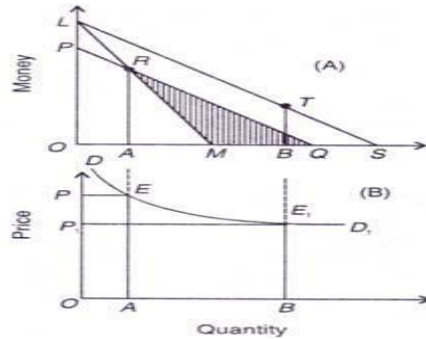
- AB is the budget line. OAB is the feasible set, given the price and income constraints for two goods M and N.
- If out of all the possible combinations of two goods M and N, the consumers chooses C, it may be deduced that the consumer has *revealed* his/her preference for C over all other possible combinations (say D, L, R).



- Demand increases when price falls money income remaining same and vice versa.
- Fall in price of M will shift the budget line to AB' .
- New preference will be at C'
- Remaining on the same point C will imply a fall in income (budget line) to $A_1 B_1$

- ✚ This theory divides the total effect into *quasi substitution* and *quasi income effects* in a manner different from indifference curve theory.
- ✚ This theory does not separate out a pure substitution effect and a pure income effect.

Derivation of the Demand Curve:



Criticisms of the Revealed Preference Theory:

1. The theory cannot explain Giffen paradox or upward sloping demand curve.
2. It provides a direct way to the derivation of the demand curve.

Theory of Consumer Behavior

When we first discussed the law of demand, we gave several reasons why the quantity demanded went up when the price of the good went down. We pointed out that as the price of a good falls, individuals will substitute some of that good for other things. Additionally, when the price of a good in a consumer's budget goes down, with all other prices remaining the same, that person's buying power will actually be greater. A person not only feels richer, he or she is richer. With a constant money income, when the price of one good falls, the person clearly has more real spending or purchasing power.

-Another way of deriving the law of demand involves an analysis of consumer choice in a world of limited resources.

1. Utility Analysis – the analysis of consumer decision making based in utility maximization.
2. Utility – the want – or satisfying power that a good or service possess.
3. Util – an artificial unit by which utility is measured.
4. Marginal Utility – the change in total utility due to a one-unit change in the quantity of a good consumed.

Ex. As you increase your consumption of hamburgers, you will get additional utility or satisfaction.

5. Diminishing Marginal Utility – the more you consume of a good, the less marginal utility you derive from each additional unit of consumption. Your first hamburger taste a lot better than your fifth.

A. The Concept of Margin Analysis – the analysis of what happens when small changes takes place relative to the status quo.

Example:

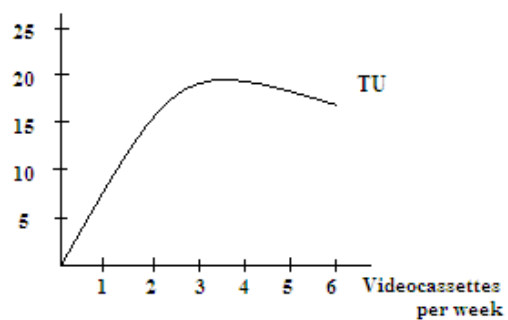
UTILITY ANALYSIS

Quantity of Dvd rentals	Total Utility	Marginal Utility
1	10	10
2	16	6
3	19	3
4	20	1
5	20	0
6	18	- 2

NOTE: If we were able to assign specific numbers to the utility derived from watching dvds each week, we could then obtain a marginal utility schedule that would probably be similar in pattern to the one above.

GRAPHICAL ANALYSIS:

Total
Utility



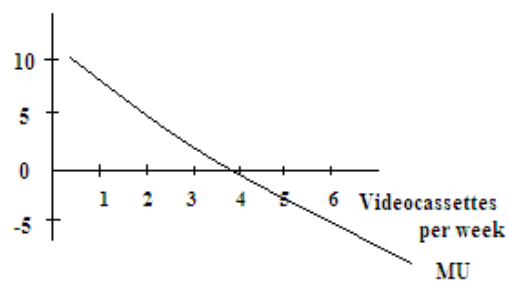
ANALYSIS OF THE GRAPH

$TU \uparrow \longrightarrow MU \downarrow (+)$

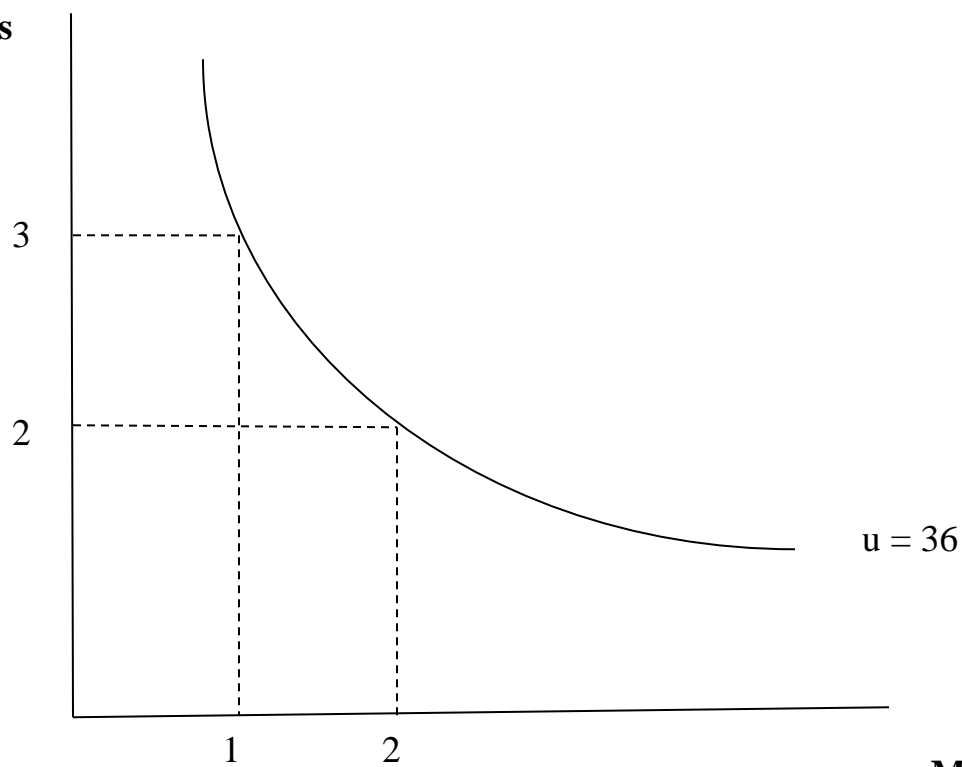
$TU_{\max} \longrightarrow MU = 0$

$TU \downarrow \longrightarrow MU (-)$

MU



Donuts



Donuts

Milk

Quantity	TU	MU
1	10	
2	18	
3	24	
4	28	
5	30	

Milk		
Quantity	TU	MU
1	12	
2	18	
3	20	
4	19	
5	16	

Draw the budget constraint

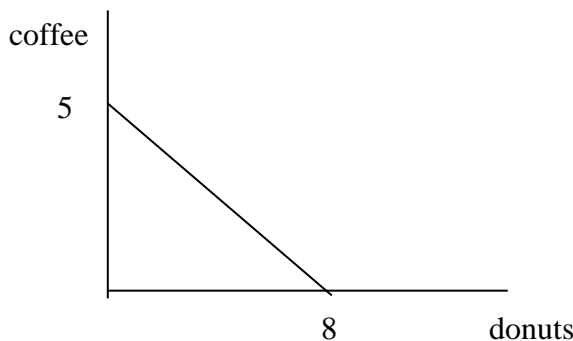
On a graph put each good on an axis.

Then ask the question, “if the consumer spent all of his or her income on this one good, how many units of the good could he or she purchase?”

Assume that you have \$4.00, and the two goods were donuts (which cost \$.50) and coffee (which cost \$1.00).

Then if you spent all of your money on donuts you could buy 8 of them (\$4.00/\$.50). If you spent all of your money on coffee, you could buy 5 cups (\$4.00/\$1.00).

The budget constraint would look like this.



Marginal Utility and Total Utility – A Look at Diminishing Marginal Utility

The graphs are those of a student consuming slices of pizza in a one day period. The total utility (TU) curve shows the level of total satisfaction he receives from different amounts of pizza consumed. The marginal utility (MU) shows the change in his total utility resulting from his consuming an extra slice of pizza. Diminishing marginal utility (DMU) refers to the case where his MU diminishes as he consumes additional slices of pizza. As long as his MU is positive, his TU will increase as he consumes extra slices. If his MU becomes negative that means his TU actually decreased when he ate the extra slice of pizza. When MU equals zero, he is maximizing his total utility from pizza.

It is important to be accurate in the distinction between his MU and his TU. These comments should be helpful. (Note: Neither the graphs nor these comments refer to the consumer's income or the price of pizza. They deal just with his pleasure from pizza.)

1. $MU = \Delta TU / \Delta Q$
2. The slope of the TU curve = $\Delta TU / \Delta Q = MU$
3. As long as MU is positive, TU increases. Since each of the first 6 units has positive MU, the student's
TU increases as he consumes the first 6 slices. This means each of the first 6 units added to his TU.
4. When MU is zero, TU has stopped increasing and is at its maximum value. The MU of the 7th slice is
zero so there is no change in his TU when he eats the 7th slice.

5. If MU is negative, TU will decrease if he consumes additional slices of pizza. Since the MU of the 8th

slice is negative, his TU will be reduced if he eats the 8th slice.

6. The MU from each of the first 3 slices is increasing. (The MU from the 2nd slice is greater than the MU

from the 1st slice, and the MU from the 3rd slice is greater than the MU from the 2nd slice.)

This means

TU is increasing at an increasing rate as the student eats the first 3 slices of pizza. Notice the slope of

the TU curve is increasing as he consumes these first 3 slices. (Remember: MU = slope of TU curve.)

7. The MU from slices beyond the 3rd slice diminishes. Thus, points A and A' represent the point of

diminishing marginal utility (DMU). In the top graph we call point A the “inflection point” on the TU

curve – the TU's slope is maximized at point A.

8. The MU to the student from the 4th, 5th, and 6th units is still positive, even though it is diminishing. This

means his TU continues to increase as he eats these slices, but TU will increase at a decreasing rate.

Note how the slope of the TU curve lessens between points A and B in the top graph. The *value* of TU

is still rising but the *slope* of the TU curve is getting smaller.

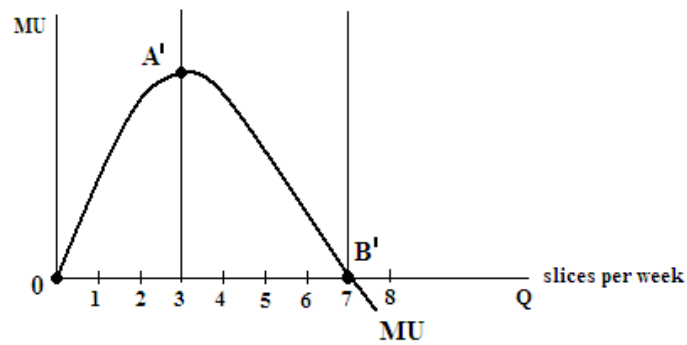
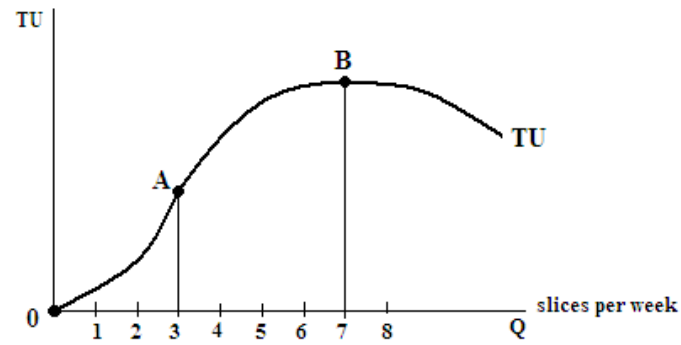
9. At point B we see TU is maximized when the student consumes 7 slices per day. At point B' we see his

MU is zero at 7 slices. The slope of the TU curve is zero at point B. (Again, remember that MU is the

slope of the TU curve so $MU = 0$ at this point.)

10. If the student eats an 8th slice of pizza, his total utility actually diminishes because this is simply too

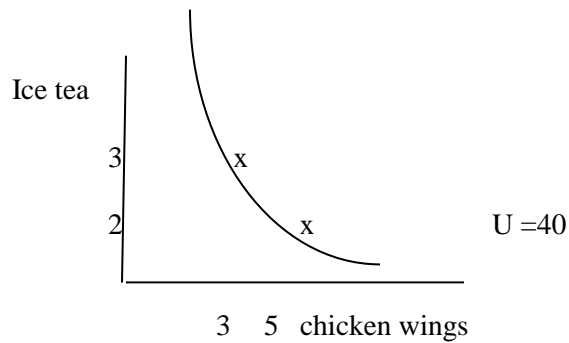
many slices for him to eat in one day without getting sick. His MU from the 8th slice is negative.



From Dr. Stone

Answers to questions above

1. $52 - 27 = 25$
- 2.



3. D
- 4.

Person A's utility information.

subs per week

Q	TU	MU
0	0	
1	20	20
2	32	12
3	43	11
4	50	7

hamburgers per week

Q	TU	MU
0	0	
1	25	25
2	40	15
3	48	8
4	50	2

5. $32+48 = 80$ versus $43+40 = 83$ (3 subs and 2 burgers)
6. The combination that maximizes total utility is 2 burgers and 1 sub
7. 2 burgers and 2 subs