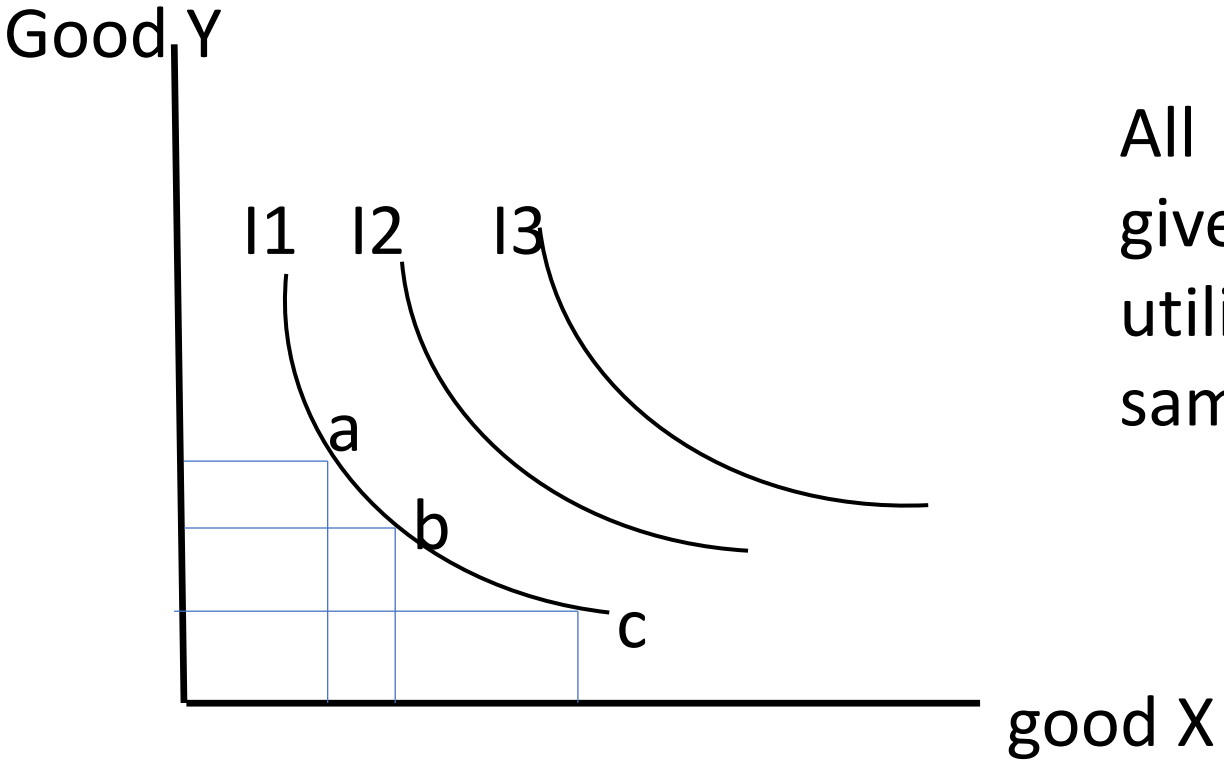
Indifference curves and consumer equilibrium

A. Indifference Curve:

it shows the combinations (bundles) of goods that give the consumer the same level of satisfaction (utility).

For example, I1 curve gives the consumer 10 units of utility, I2 gives 20 units and I3 gives 30 units of utility.



All points along the indifference curve give the consumer the same level of utility. A, B and C give the consumer the same level of utility.

Properties of Indifference Curves

1. negative slope:

The consumer should decrease the consumption of one good to increase the consumption of another good.

The slope of indifference curve is called the marginal rate of substitution (MRS).

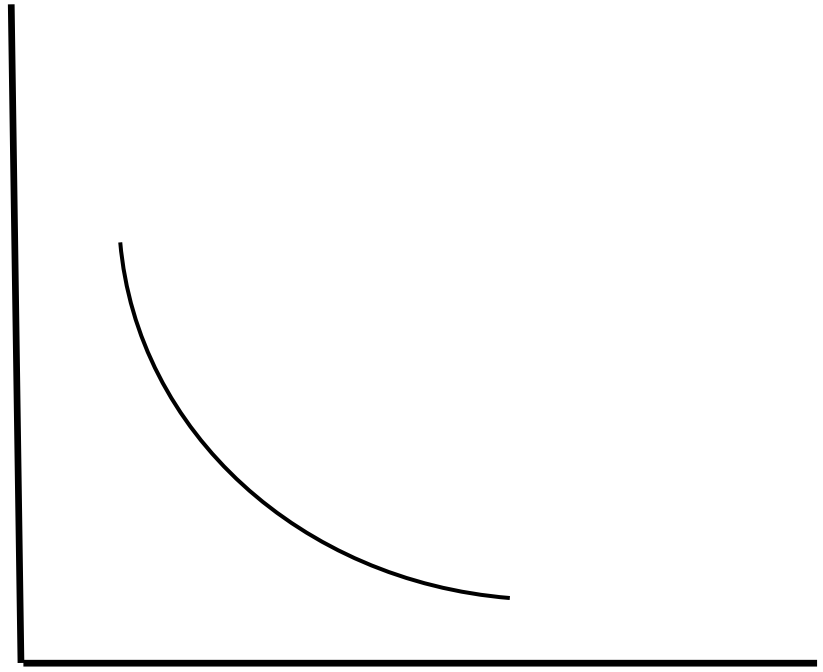
MRS : is the amount of good (y) that the consumer is willing to give up for an additional unit of another good (x) to remain on the same indifference curve.

$$\mathbf{MRS}_{yx} = \frac{MU_x}{MU_y} = \frac{\Delta Y}{\Delta X}$$

The marginal rate of substitution equals the ration of marginal utilities.

2. Convex to the origin:

This property comes from the assumption that the MRS decreases when we move along the indifference curve.



3. More utility the further from the origin:

The higher indifference curve gives the consumer more utility than the lower indifference curve.

For example I2 gives the consumer higher utility than I1.

4. It can not intersect:

Indifference curves are parallel lines.

B. Budget Constraint

*Budget Constraint i*s the amount of income that the consumer spends on goods and services. Assume that there are two goods x and y, and the income is (I).

the consumption of two goods depends on the income (I) and the price of two goods (Px and Py).

The budget line:

The budget line shows the maximum amount of each good that the consumer can purchase by spending the income.

- **The equation of budget line is as follows:**

$$P_x X + P_y \mathbf{Y=I}$$

the spending on good x + the spending on good y = income

Example:

if the price of x=4 , the price of y =2 and the income (I) =20. graph the budget line.

- The equation of budget line is:

$$P_x X + P_y \text{Y} = \text{I}$$

$$4\text{ X} + 2\text{ Y} = 20$$

If he spends his income on x only (y=0).

The maximum quantity of x = 20/4 =5

- The first point is (0,5)

If he spends his income on y only (x=0)

The maximum quantity of

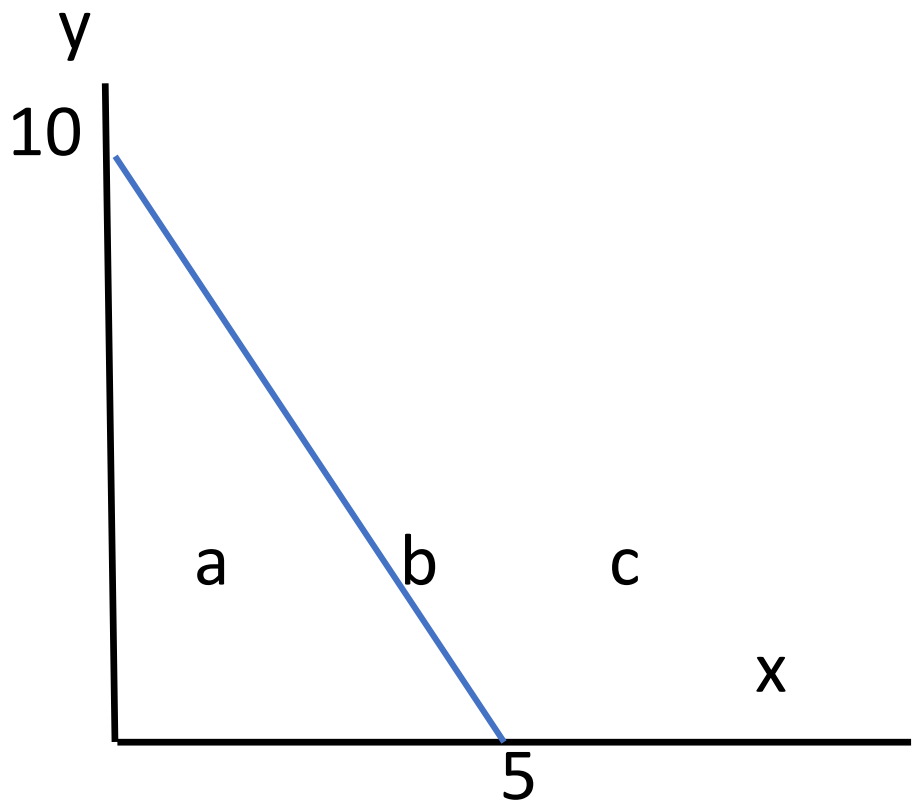
y = 20/2 =10

The second point is (10, 0)

The slope of budget line equals the relative price of x to y.

the slope of budget line= $\frac{\Delta y}{\Delta x} = \frac{P_x}{P_y} = \frac{10}{5} = 2$

the slope of budget line equals the ratio of prices



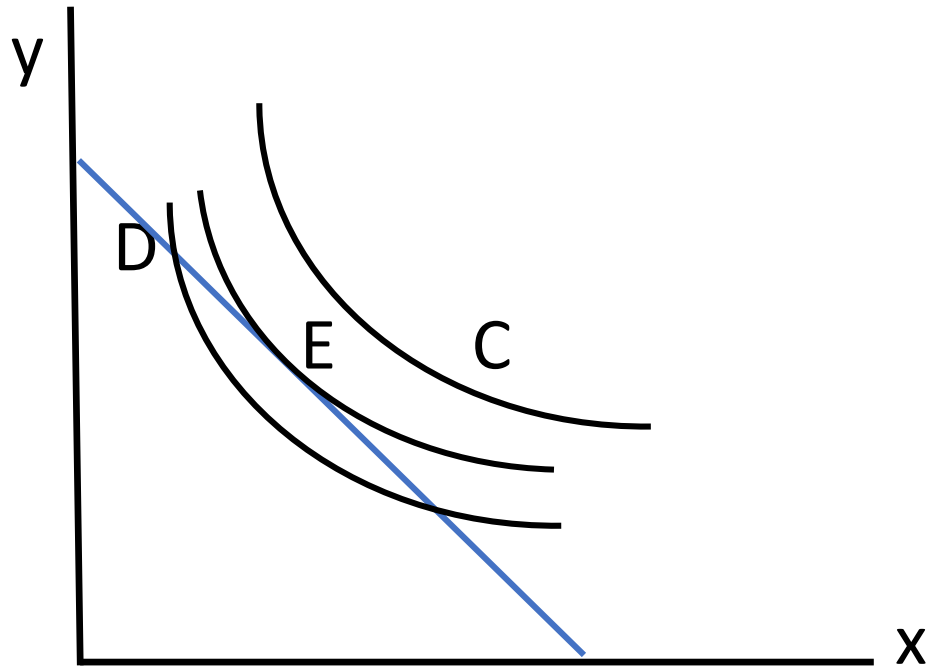
All points inside the budget line are affordable bundles. The points outside the budget line are unaffordable bundles

$4X + 2Y = 20$

UNITS OF X	UNITS OF Y
0	10
1	8
2	6
3	4
4	2
5	0

C. Consumer Equilibrium:

The consumer chooses the point on budget line that is on the highest attainable indifference curve, where the budget line touches the highest indifference curve. Point E is the equilibrium point.



- D is on lower indifference curve.
- Points beyond the budget line (like c) are unobtainable.

Equilibrium condition:

At the equilibrium point, the slope of budget line= the slope of indifference curve.

MRS = Relative prices

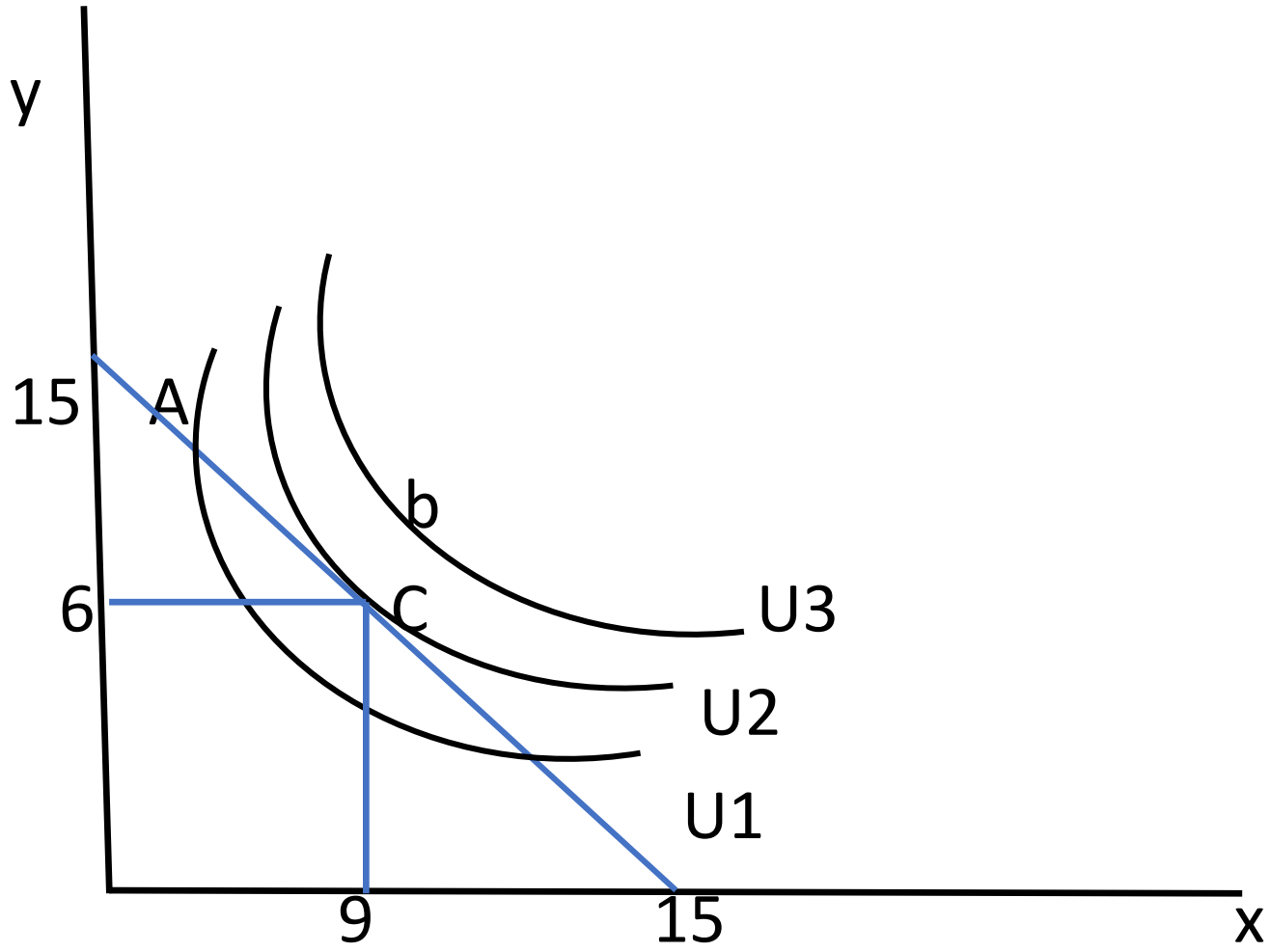
$$\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

The ratio of marginal utilities= the ratio of prices

- We can rearrange this condition to:

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

Q1: Indifference curve:



suppose that the price of x is one pound and the price of y is also one pound. What is the income?

1- What is the income

The equation of budget line is as follows:

$$P_x X + P_y \text{Y} = \text{I}$$

$$15 + 0 = \text{I}$$

Income =15 pounds

2- What is the slope of budget line?

the slope of budget line= $\frac{\Delta y}{\Delta x} = \frac{P_x}{P_y} = \frac{1}{1} = 1$

3- what is the equilibrium point? Why?

the equilibrium point is point C because the slope of budget line equals the slope of indifference curve.

MRS = Relative prices

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

4- How many units of X and Y should the individual purchase?

The equilibrium is at point C.

The quantity of x is 9 units and the quantity of Y is 6 units.

5- Why individual does not maximize utility at point A?

The consumer can increase the utility by moving from A to C because point C is at higher indifference curve.

6- why the individual can not reach point B?

This is because point B is beyond the budget line.

The rule of equal marginal utility per dollar spent

- If there are two goods. The law of equal marginal utility per dollar is

$$\frac{MU1}{P1} = \frac{MU2}{P2}$$

The marginal utility per dollar for the first good= the marginal utility per for the second good.

The second condition: budget constraint

Spending on first good + spending on second good = total spending

If you have two goods: pizza and milk. if the price of pizza is 2 dollars, the price of milk is one dollar and the person has 10 dollars to spend on the two goods. What is the optimal decision for this person?

Slices of pizza	Total utility of pizza	Cups of milk	Total utility of milk
1	20	1	20
2	36	2	35
3	46	3	45
4	52	4	50
5	54	5	53
6	52	6	52

The marginal utility per dollar for pizza = the marginal utility per for milk

$$\frac{MU1}{P1} = \frac{MU2}{P2}$$

slices	Total utility	Marginal utility	$\frac{MU1}{P1}$	cups	Total utility	Marginal utility	$\frac{MU2}{P2}$
1	20	20	10	1	20	20	20
2	36	16	8	2	35	15	15
3	46	10	5	3	45	10	10
4	52	6	3	4	50	5	5
5	54	2	1	5	53	3	3
6	52	-2	-1	6	52	-1	-1

Combinations with equal marginal utility per dollar	Marginal utility per dollar	Total spending
One slice of pizza and 3 cups of milk	10	2+3= 5
3 slices of pizza and 4 cups of milk	*5*	*6+4=10*
4 slices of pizza and 5 cups of milk	3	8+5=13