

EE211

PRINCIPLES OF MICROECONOMICS

Topic 6:

The Theory of Consumer Choice

Topics

- Utility Theory (Cardinal Approach)
 - Utility
 - Marginal utility
 - Law of diminishing marginal utility
- Indifference Curve Theory (Ordinal Approach)
 - Indifference curve
 - Marginal rate of substitution
 - Budget line
 - Consumer equilibrium
- Demand curve derivation
- Applications

Part I: Utility Theory (Cardinal Approach)

- **Utility** is the *satisfaction* or *well-being* that a consumer receives from *consuming some good or service*.
 - Economists assume that, in making their choices, *consumers are motivated to maximize their utility*.
- **Total utility** is the total satisfaction resulting from consumption of a given commodity by a consumer.
- **Marginal utility** is the *additional satisfaction* obtained by a consumer from consuming one *additional unit* of a commodity.

$$\bullet MU_x = \frac{\Delta U}{\Delta X} = \frac{dU}{dx} \quad \text{where } x \text{ is quantity of good } x$$

Example: Utility Schedules

X

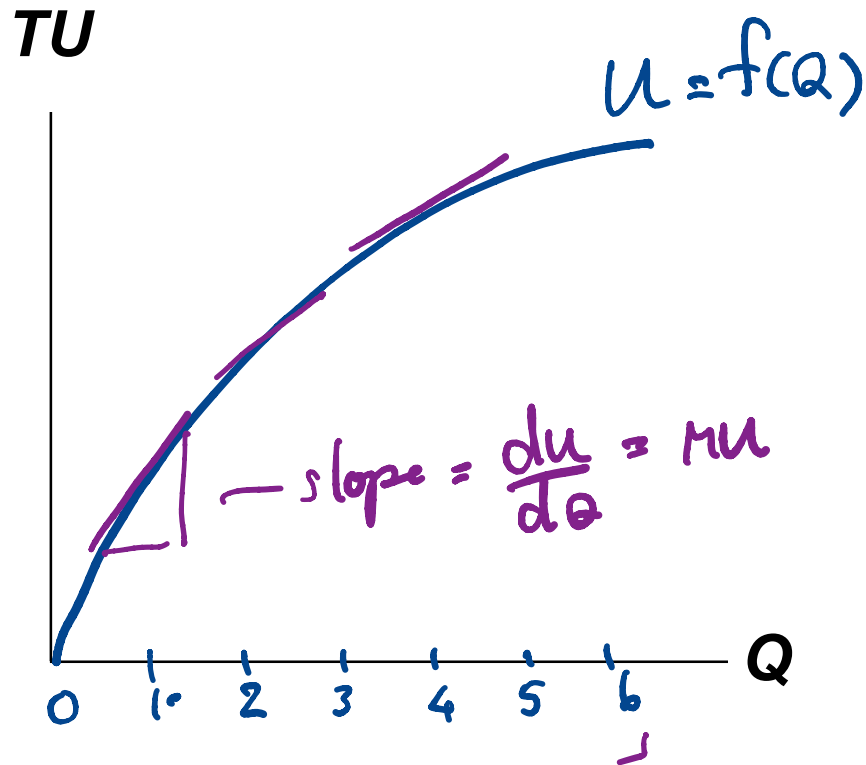
u

$$MU = \frac{\Delta u}{\Delta X}$$

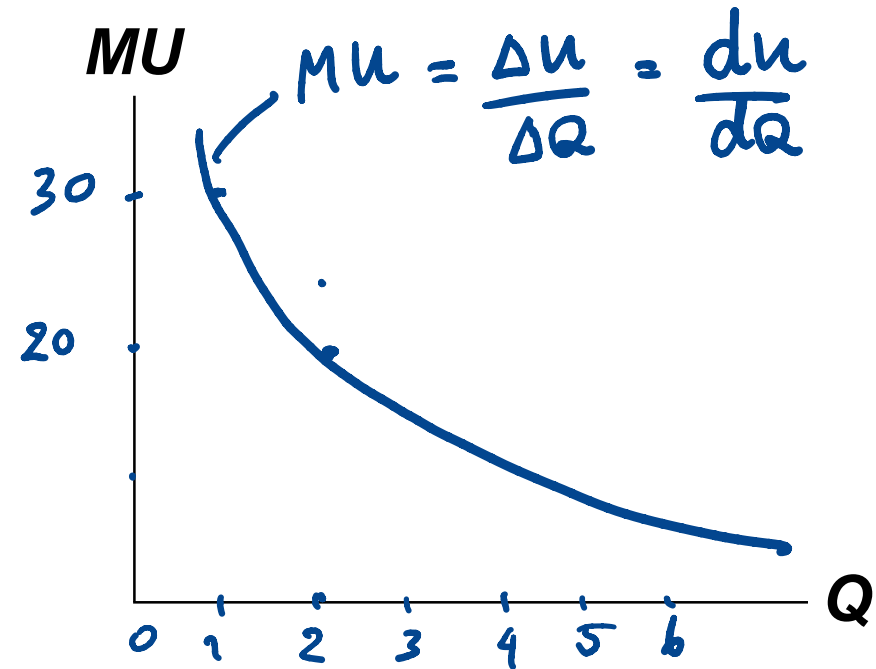
Number of Coffee Tom Drinks per day	Tom's Total Utility	Tom's Marginal Utility
0	0	
1	30	30
2	50	20
3	65	15
4	75	10
5	83	8
6	89	6

Example: Utility Graphs

- Total Utility



- Marginal Utility




Total utility rises, but marginal utility decreases, as consumption rises.

Diminishing Marginal Utility

- **Law of diminishing marginal utility** $\frac{du}{dx} > 0$

“The utility that any consumer derives from *successive* units of a particular product consumed over some period of time *diminishes* as total consumption of the product increases, if the consumption of all other products is unchanged.”

$$\frac{d^2u}{dx^2} < 0$$


Maximizing Utility

- The consumer's decision:

A **utility-maximizing consumer** allocates expenditures so that the **utility obtained from the last dollars** spent on each product is equal.

Suppose we consume 2 goods, X and Y

Mathematically,

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

3 goods :

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

Alternatively,

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

Example

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

- Suppose you are buying Good X for \$1 each and Good Y for \$3 each, and the marginal utility of each good is the following.

$$P_x = 1 \quad \frac{P_x}{P_y} = \frac{1}{3}$$

$$P_y = 3$$

# of X Q_x	MU_x	MU_x / P_x
1	30	30
2	20	20
3	15	15

# of Y Q_y	MU_y	MU_y / P_y
1	60	20
2	51	17
3	45	15

How many units of goods X and Y should you buy in order to maximize your utility?

2 units of X and 1 unit of Y
 or 3 " " " " " "

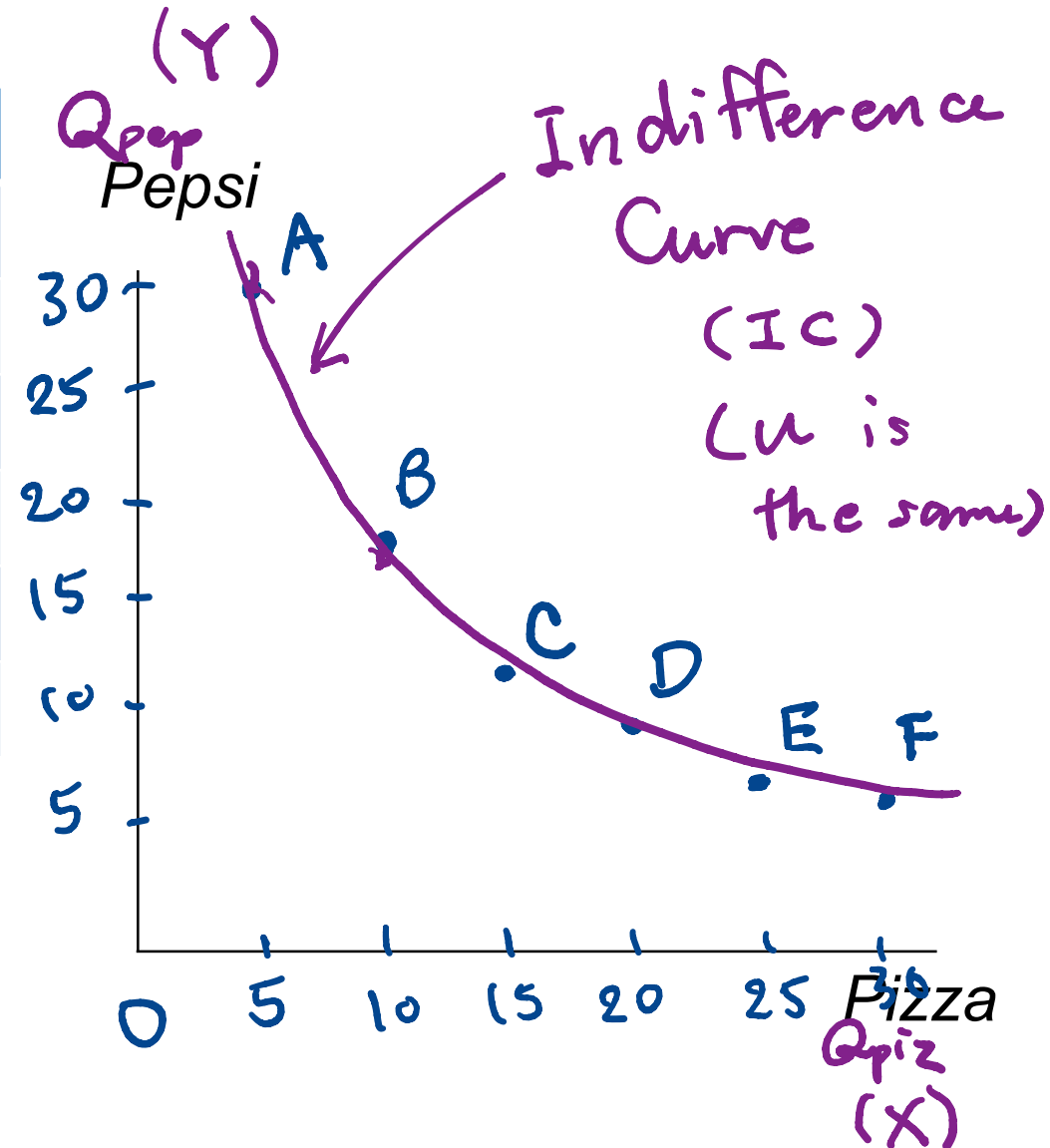
Part II. Indifference Curve Theory (Ordinal Approach)

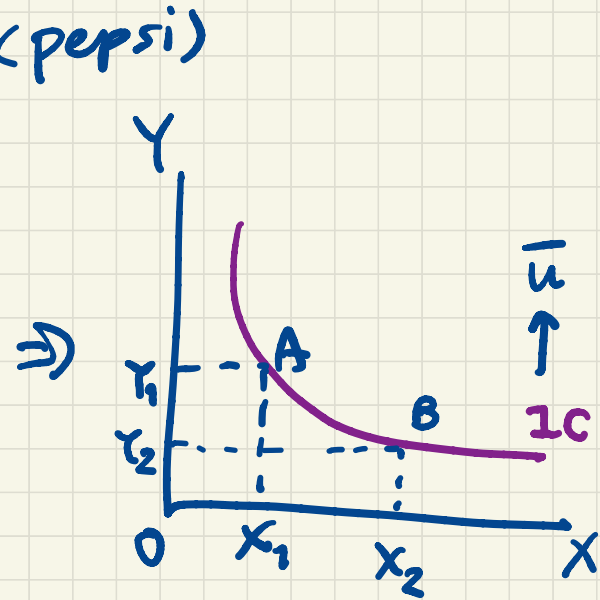
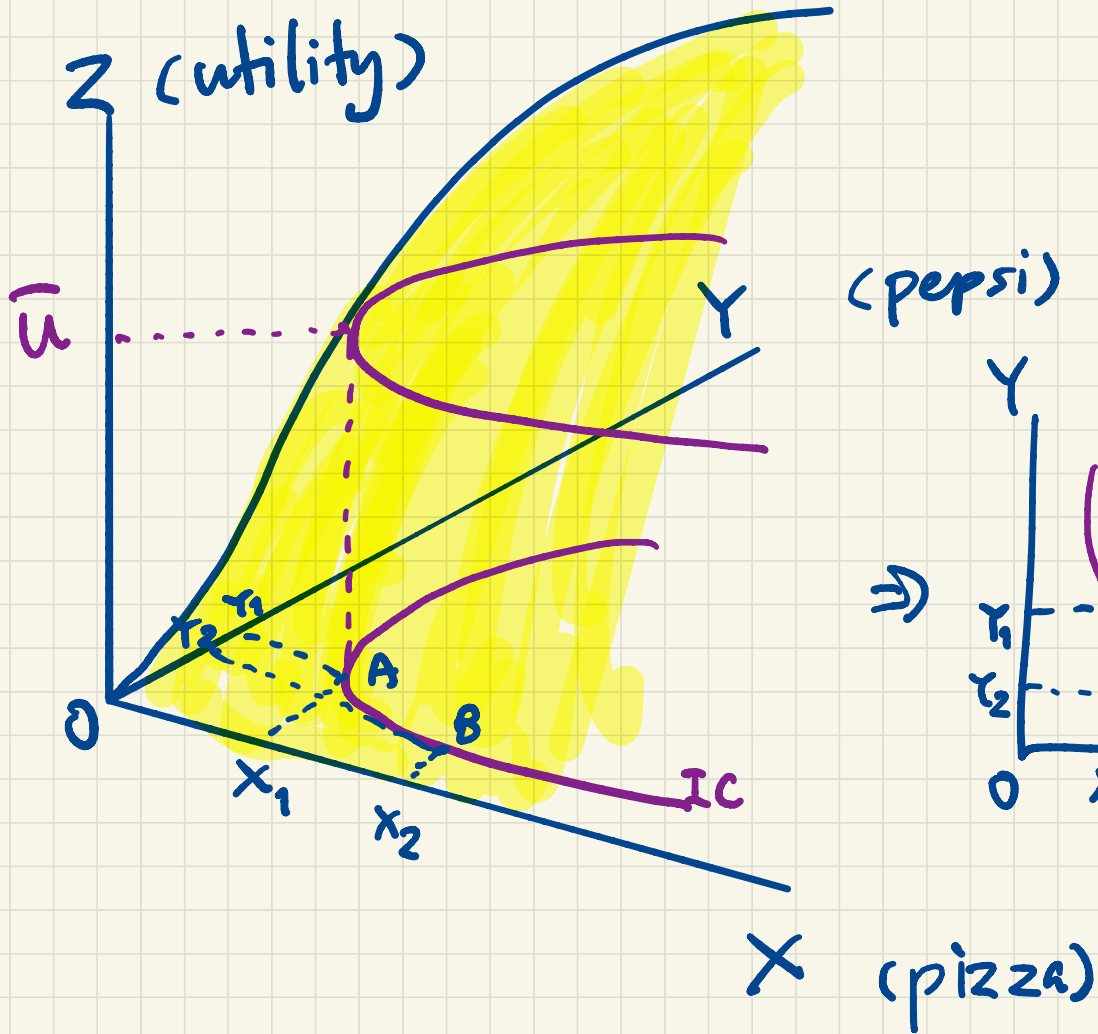
- There is **no numerical value** attached to consumer's utility.
- Instead, consumer is asked which bundle is preferred to which.
- **Indifference curve** shows **consumption bundles** that give the consumer the same level of satisfaction.
- With **2 products X and Y**, a bundle is represented by a point in diagram.

Example: Indifference Curve (Quantities)

Bundle	Pepsi	Pizza
A	30	5
B	18	10
C	13	15
D	10	20
E	8	25
F	7	30

At any bundle on the same IC, you have the same satisfaction.

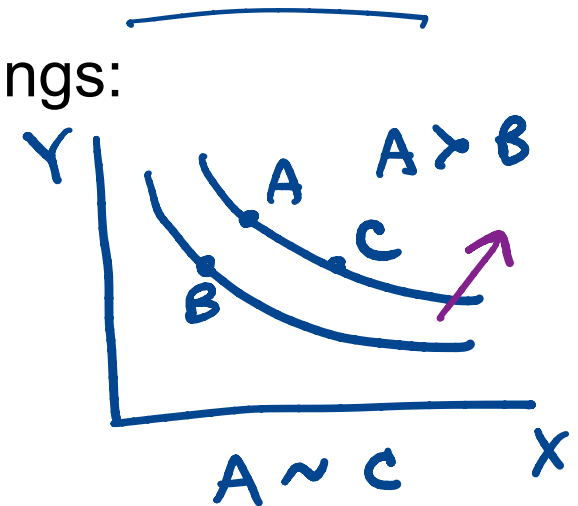




Assumptions

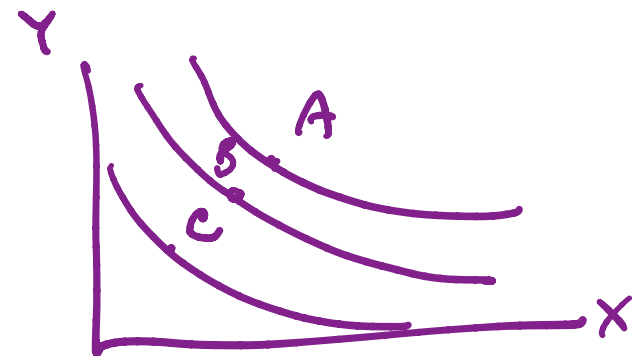
- Given any 2 bundles A & B, the consumer's preference is assumed to be exactly one of the followings:

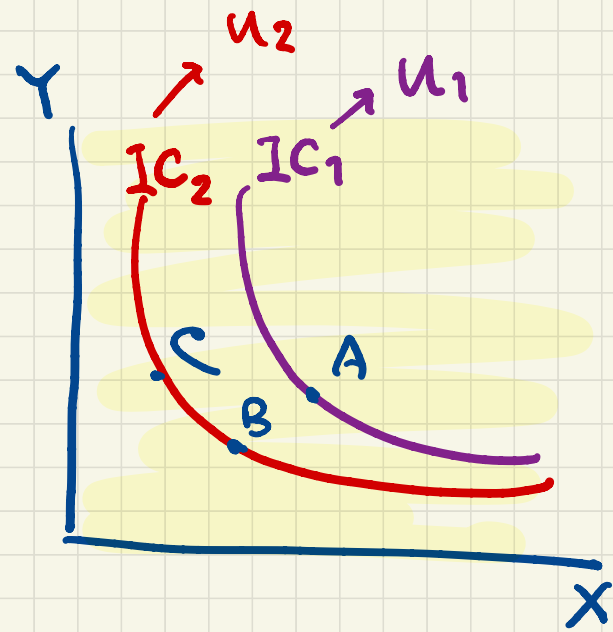
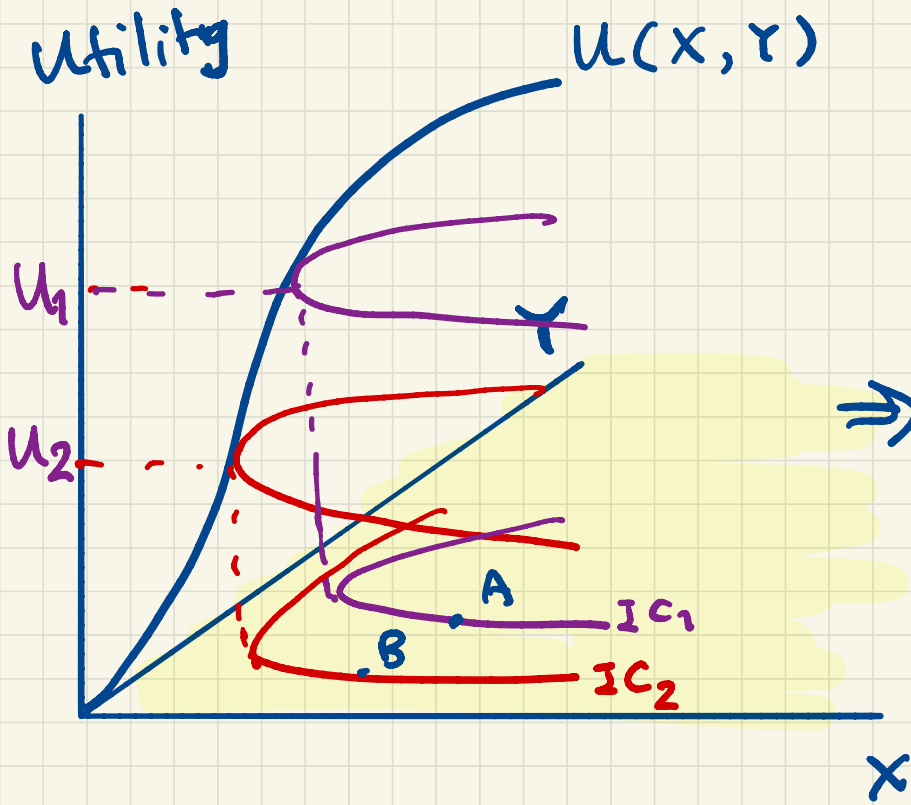
1. A is preferred to B ($A \succ B$).
- or 2. B is preferred to A (~~$A \succ B$~~). ($B \succ A$)
- or 3. A & B are indifferent ($A \sim B$).



- Consumer is assumed to be rational.

- More is preferred to less.
- If $A \succ B$ and $B \succ C$, then $A \succ C$.





- A \succ B
- A \succ C
- B \sim C

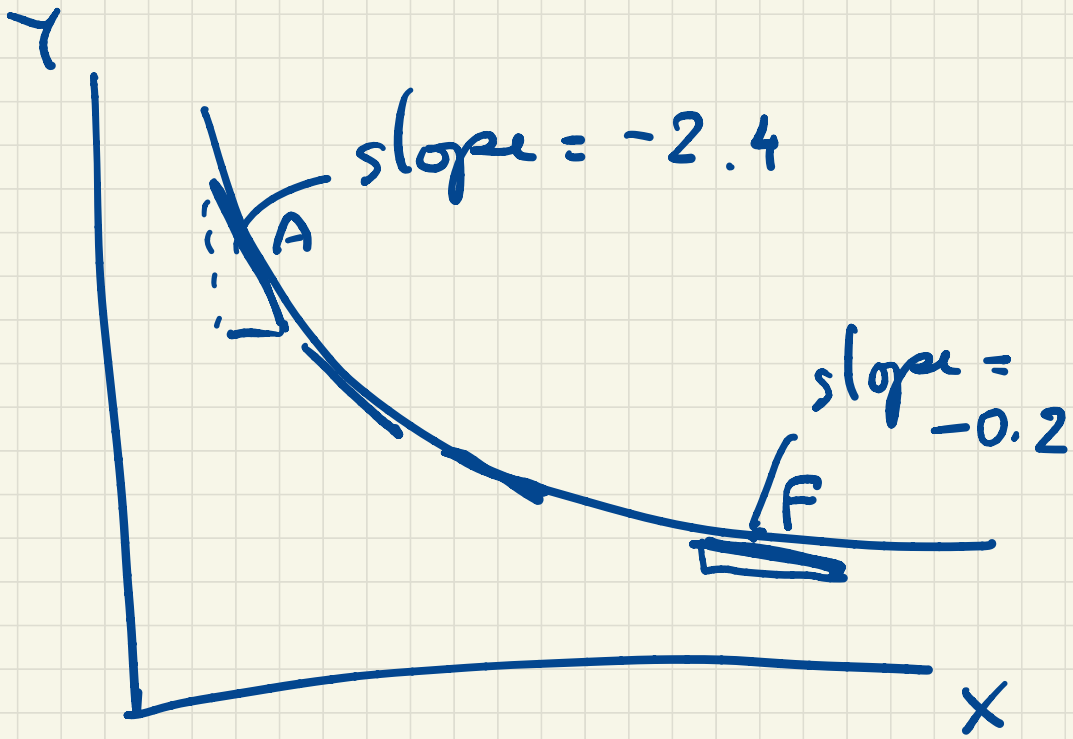
Marginal Rate of Substitution

- **Marginal rate of substitution (MRS)** is the rate at which a consumer is willing to trade one good for another.
- Also, it is the **slope of the indifference curve**. $\Rightarrow MRS = \frac{\Delta Y}{\Delta X}$
 $= \frac{dY}{dX}$
- Basic assumptions of indifference curve theory:
 1. The algebraic value of the MRS between two goods is **always negative**.
 2. The MRS is **diminishing** (i.e. any indifference curve becomes flatter as the consumer moves downward and to the right along the curve).

Example: Indifference Curve & MRS

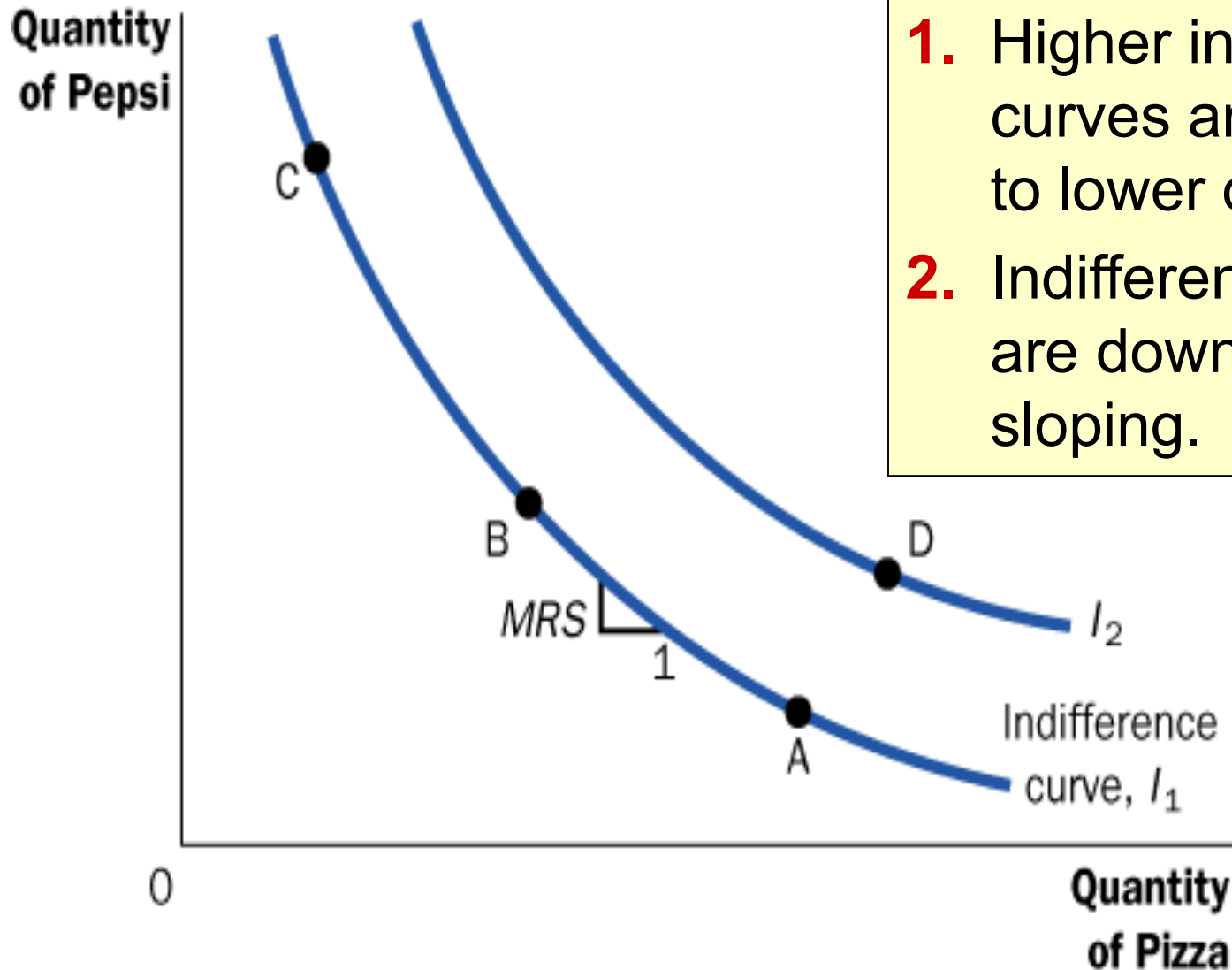
	Y	X
Bundle	Pepsi	Pizza
A	30	5
B	18	10
C	13	15
D	10	20
E	8	25
F	7	30

Δ	ΔY	ΔX	MRS $= \frac{\Delta Y}{\Delta X}$
Change	Change in Pepsi	Change in Pizza	
A \rightarrow B	-12	5	-2.4
B \rightarrow C	-5	5	-1
C \rightarrow D	-3	5	-0.6
D \rightarrow E	-2	5	-0.4
E \rightarrow F	-1	5	-0.2



As $x \uparrow$, MRS_{xy} is smaller (in absolute values).

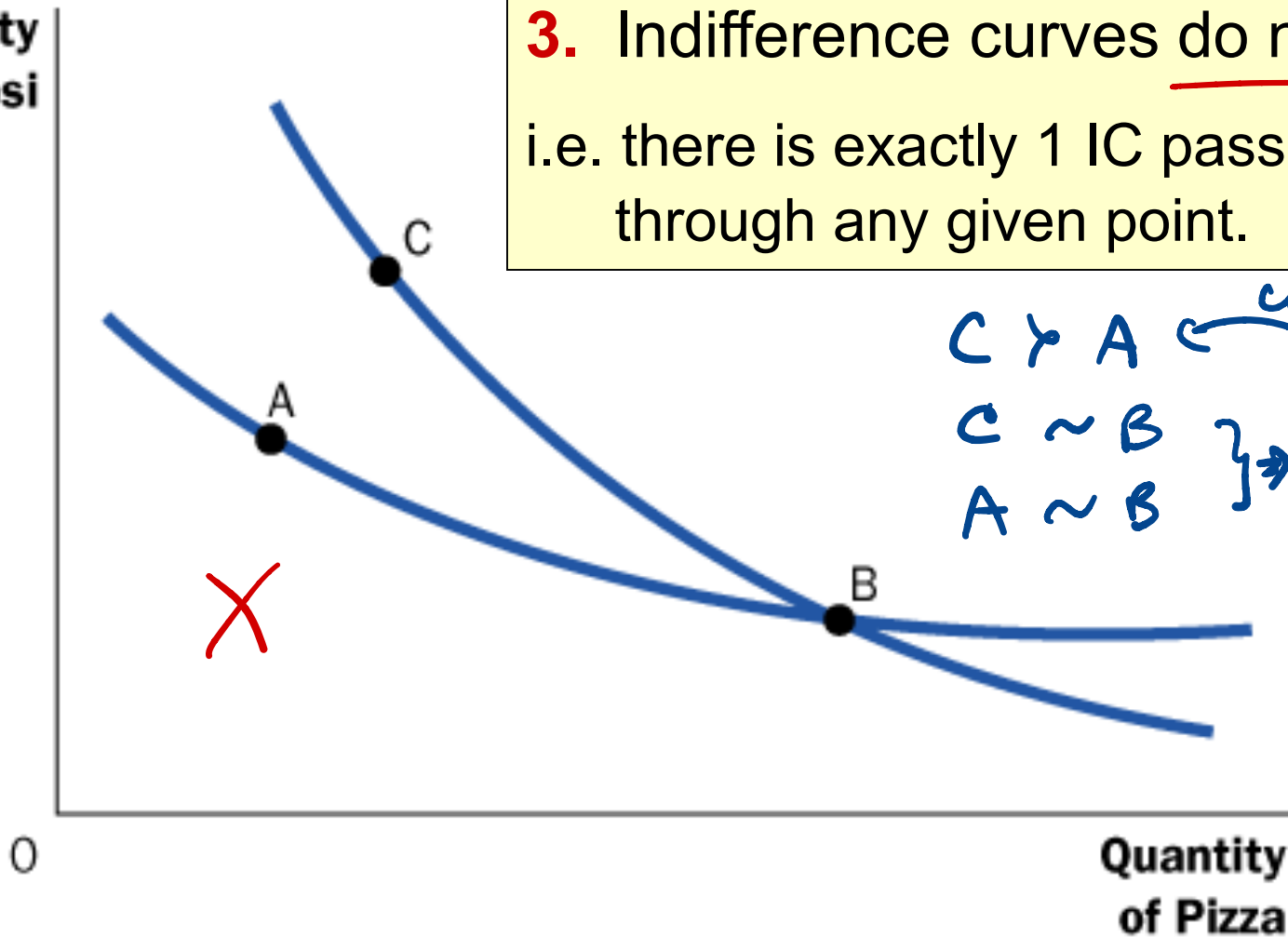
Properties of Indifference Curve



1. Higher indifference curves are preferred to lower ones.
2. Indifference curves are downward sloping.

Properties of Indifference Curve

Quantity
of Pepsi



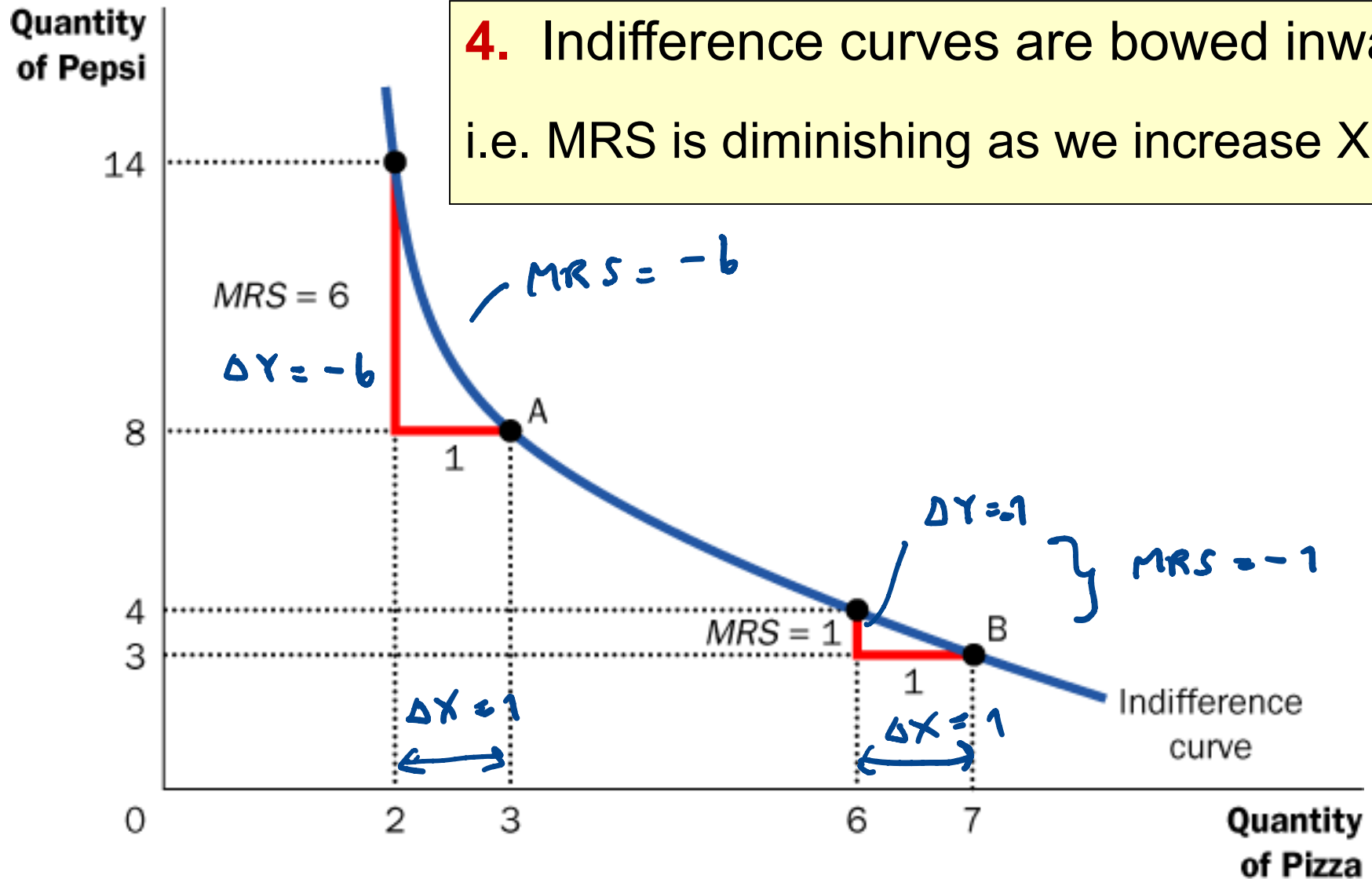
3. Indifference curves do not cross.

i.e. there is exactly 1 IC passing through any given point.

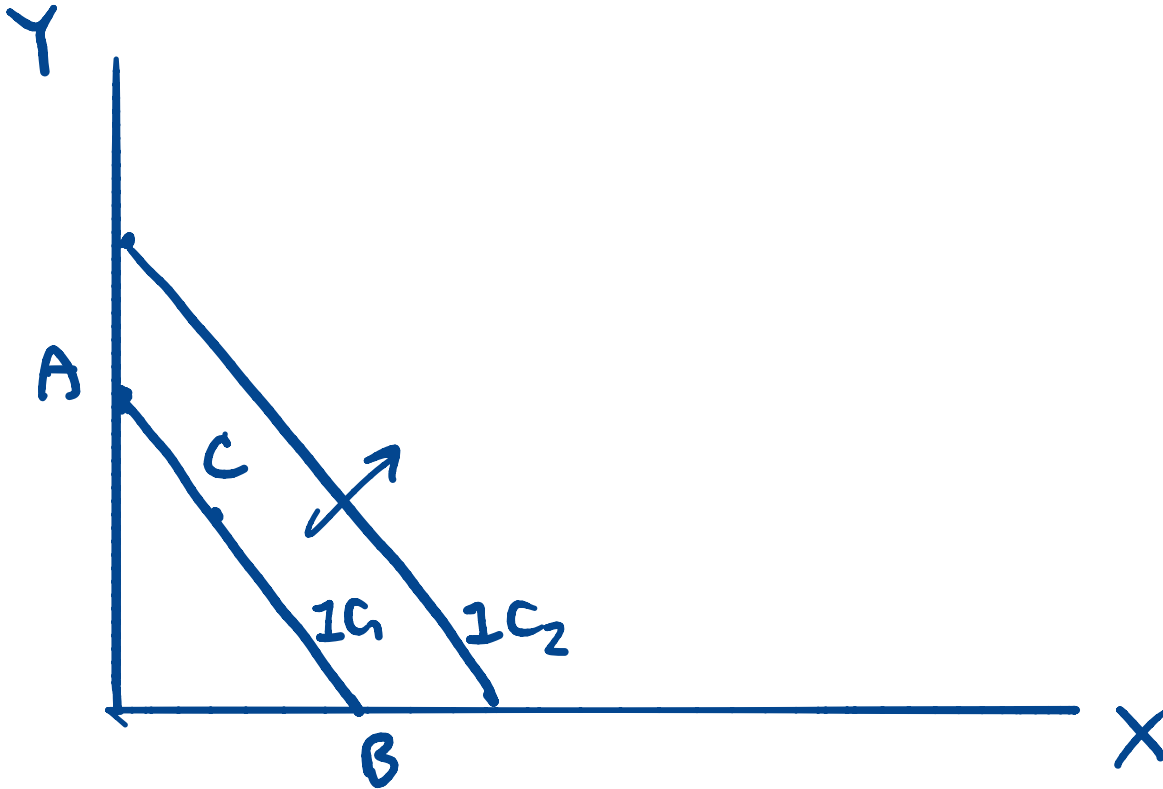
$C > A$ ← contradiction!
 $C \sim B$
 $A \sim B$ } $\Rightarrow C \sim A$

Properties of Indifference Curve

4. Indifference curves are bowed inward.
i.e. MRS is diminishing as we increase X.



Extreme Case: Perfect Substitutes



Extreme Case: Perfect Complements

