Chapter 3:
Consumer Preferences and the Concept of Utility

Outline

- Introduction
- Consumer preferences
- The Utility functions
  - Marginal utility and diminishing marginal utility
  - Indifference curves
  - Marginal rate of substitution
  - Special functional forms

Introduction

- We need to develop a model about individual or consumer behavior
- Model is based on:
  1. Individual tastes or preferences determine the amount of pleasure people derive from goods and services. (Chapter 3)
  2. Consumers face constraints (budget) that limit their choices
  3. Consumers maximize their well-being or pleasure from consumption, subject to the constraints they face.
- We want our model to be realistic so we can predict consumer behavior. But, still as simple as possible.

Description of Consumer Preferences

Consumer Preferences tell us how the consumer would rank any two basket of goods, assuming these allotments were available to the consumer at no cost.

baskets or **bundles** is a collection of goods or services that an individual might consume.

Clicker Question Review

The assumption about preferences include:

a. Preferences need to be complete

b. Preferences must be transition

c. Preferences must be monotonic

d. All of the above

Properties of Consumer Preferences

Assumptions about preferences for consumer behavior

1. Complete: Preferences are **complete** if the consumer can rank any two baskets of goods

i. A strictly preferred to B (A ⟩ B)
ii. B strictly preferred to A (B ⟩ A)
iii. indifferent between A and B (A ≈ B)

2. Transitive: Preferences are transitive if a consumer who prefers basket A to basket B, and basket B to basket C also prefers basket A to basket C

No illogical behavior

A ⟩ B and B ⟩ C ⟶ A ⟩ C NOT C ⟩ A

Properties of Consumer Preferences

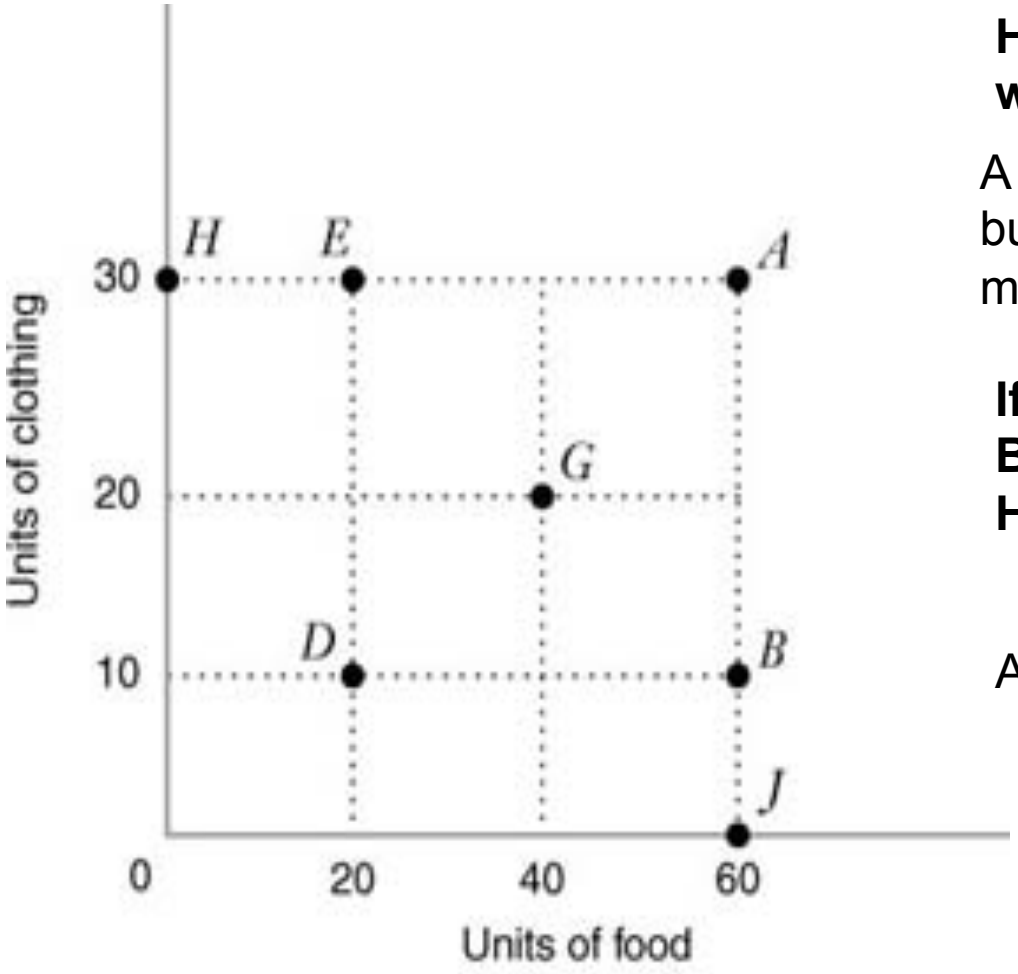
3. **Monotonic (more is better) Preferences:** are monotonic if a basket with more of *at least one* good and no less of any good is preferred to the original basket.

– free disposal can't be worse of with more

- The more is better assumption is also known as the property of non-satiation.
- It assumes are looking at what economists call a 'good'. Something we want more of
- We are not looking at a 'bad' i.e. pollution
- We can relax this assumption it is the first two that are crucial for the analysis

Preferences Examples

Which bundles are better because more is better?



How do you rank A and B and why?

A preferred to B because with bundle A get more clothing – use more is better assumption

If A is preferred to B and B is preferred to E. How are A and E ranked?

A ⟩ B ⟩ E so A ⟩ E

Intransitivity and Age
Is this a good assumption?

Age	Number of Subjects	Intransitive Choices (%)
4	39	83
5	33	82
6	23	82
7	35	78
8	40	68
9	52	57
10	45	52
11	65	37
12	81	23
13	81	41
Adults	*99*	*13*

Source: See Hirshleifer, Jack and D. Hirshleifer, *Price Theory and Applications*. Sixth Edition. Prentice Hall: Upper Saddle River, New Jersey. 1998.

Ordinal vs Cardinal Clicker Question

Students take an exam. After the exam, the students are ranked according to their performance.

An ordinal ranking is one where:

A. Students are listed in order of their performance (i.e., Harry did best, Joe did second best, Betty did third best, and so on).

B. Students are listed by their actual grade on their exam, absolute grading standard (i.e., Harry got 50, Joe got 100, so Joe did 2 times better than Harry).

Ordinal vs Cardinal Rankings

- **Ordinal Ranking:** gives information on how a consumer ranks different baskets of goods. But it does not say by how much (i.e. 2 times as much)
  - This is how we view preferences.
- **Cardinal Rankings:** gives information on the intensity of the consumer preferences (i.e. they like basket A 10 times more than basket B).
  - Would be hard to say I like eating pizza out 10.5 times more than eating bad Chinese. Putting an exact number to our preferences is hard! – **this is why we use ordinal rankings for consumer preferences**

Utility Function

- Utility Function: measures the level of satisfaction that a consumer receives from any basket of goods. The levels show a ranking

  $U=F(x_1,x_2,x_3, \ldots\ldots, x_n)$, where the x's are quantities of n goods that might be consumed in a period

  Is utility ordinal or cardinal?

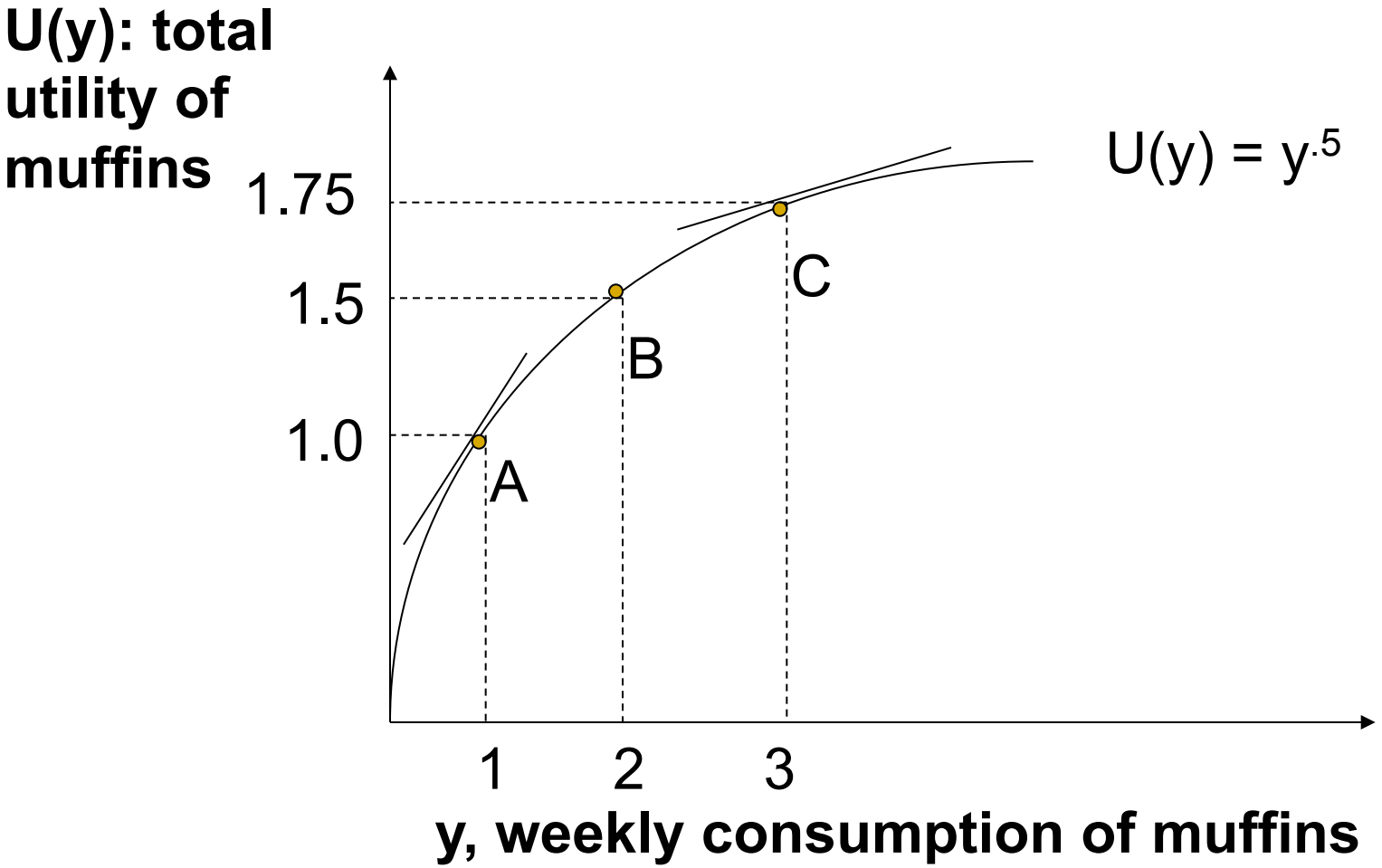
Utility is an **ordinal** concept: the precise magnitude of the number that the function assigns has no significance.

Utility Functions

- Difference in magnitudes of utility are *just a ranking* .
  - *Can't give say how much bigger one is than other*
- Utility not comparable across individuals because we don't have magnitudes for an individual just their rankings

Utility Function (one good in utility)

Are the assumptions on preferences meet?



Slopes on A and C give marginal utility – each additional unit makes person happy but by less than the previous unit

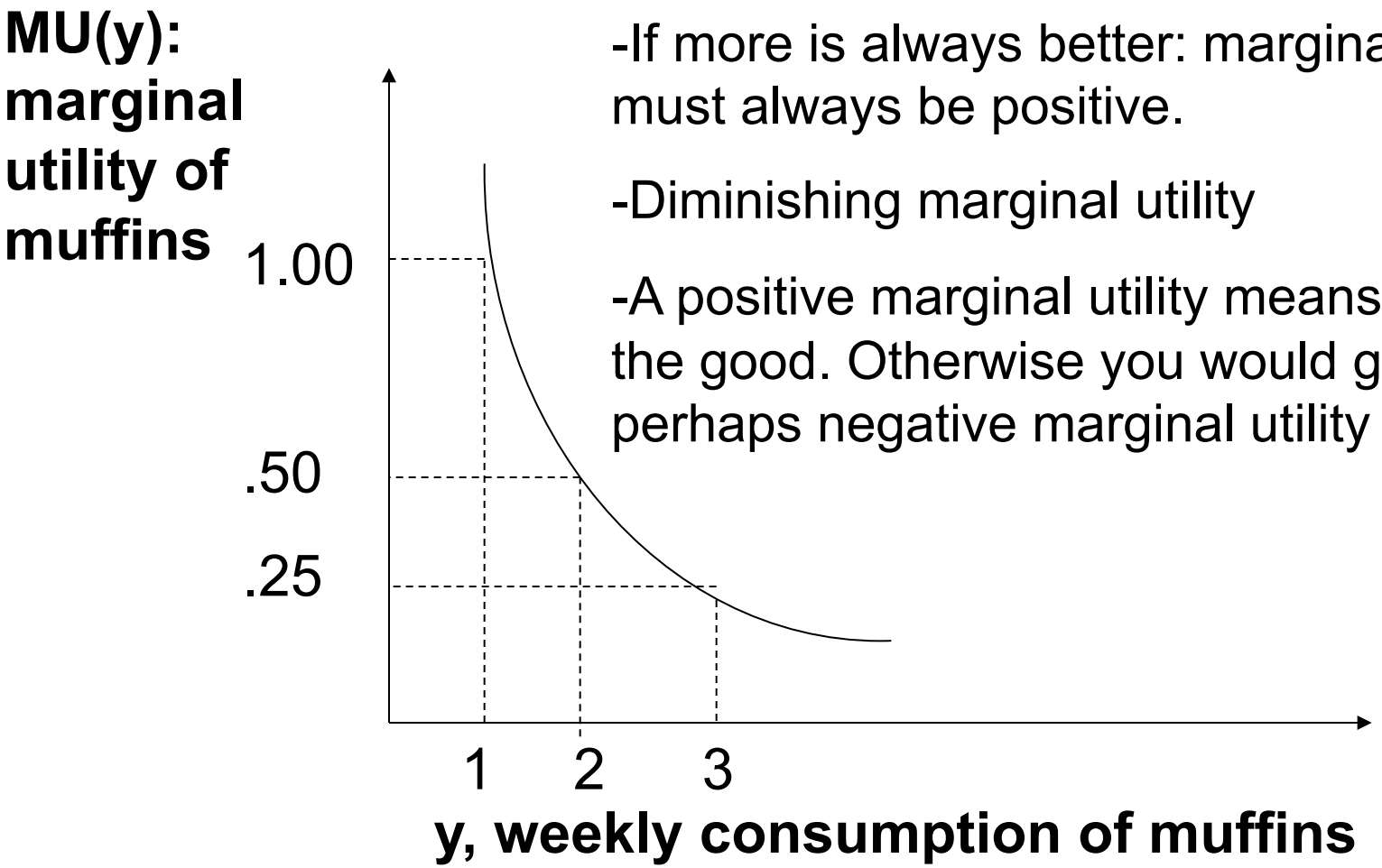
Marginal Utility
One good in the utility function

Marginal Utility: Rate at which total utility changes as the level of consumption rises.

- Each new muffin makes you happier, but makes you happier by smaller and smaller amount.

$$MUy = \frac{\Delta U}{\Delta y} = \frac{\partial U}{\partial y} = \text{Slope of the utility curve}$$

Marginal Utility



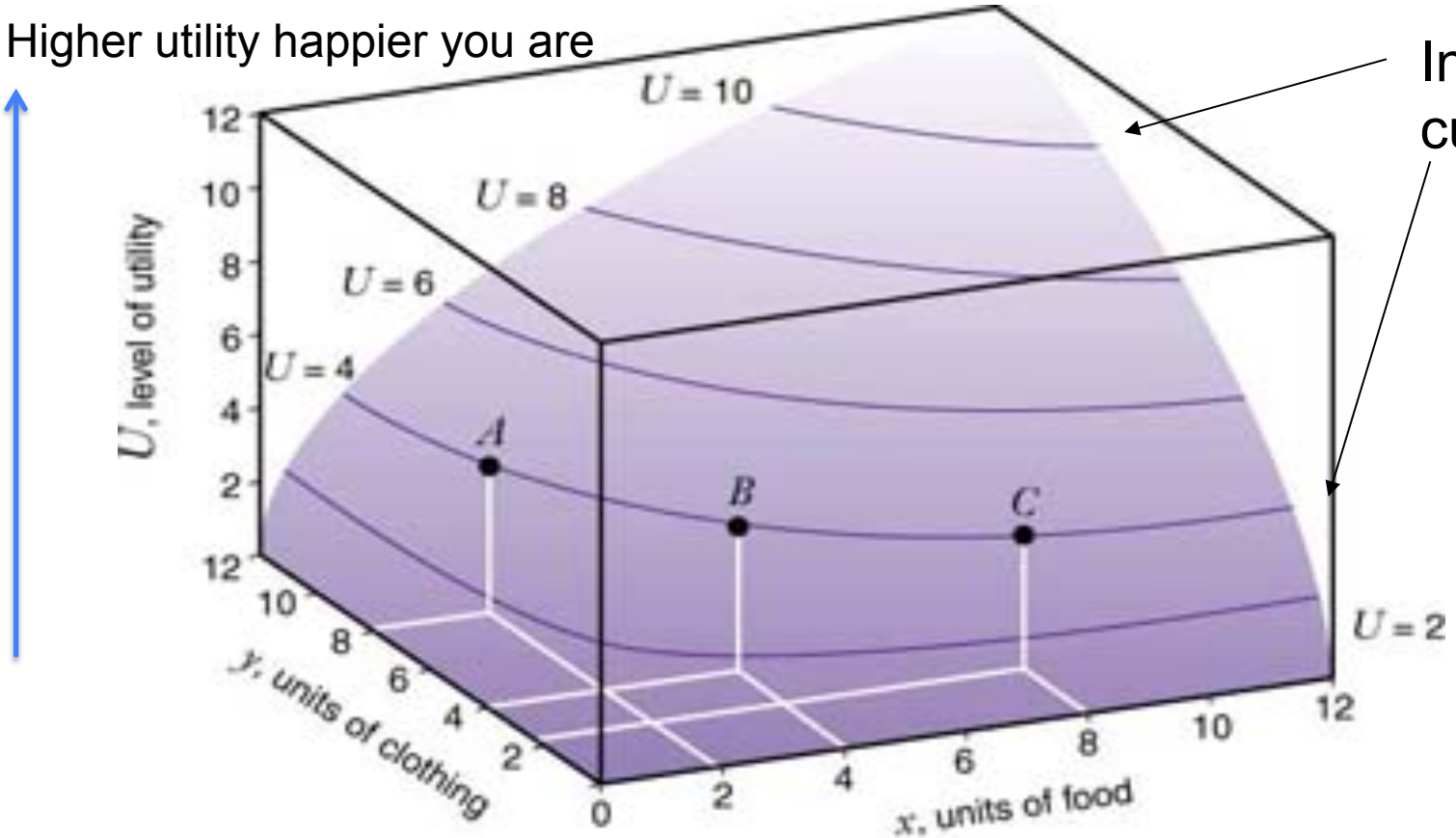
-If more is always better: marginal utility must always be positive.

-Diminishing marginal utility

-A positive marginal utility means you like the good. Otherwise you would get zero or perhaps negative marginal utility

Utility Function and Indifference Curve (2 goods in utility)

Higher utility happier you are



BESANKO/Microeconomics, 2e fig. 3-4 w36 s/s

Marginal Utility
More than one good in the utility function

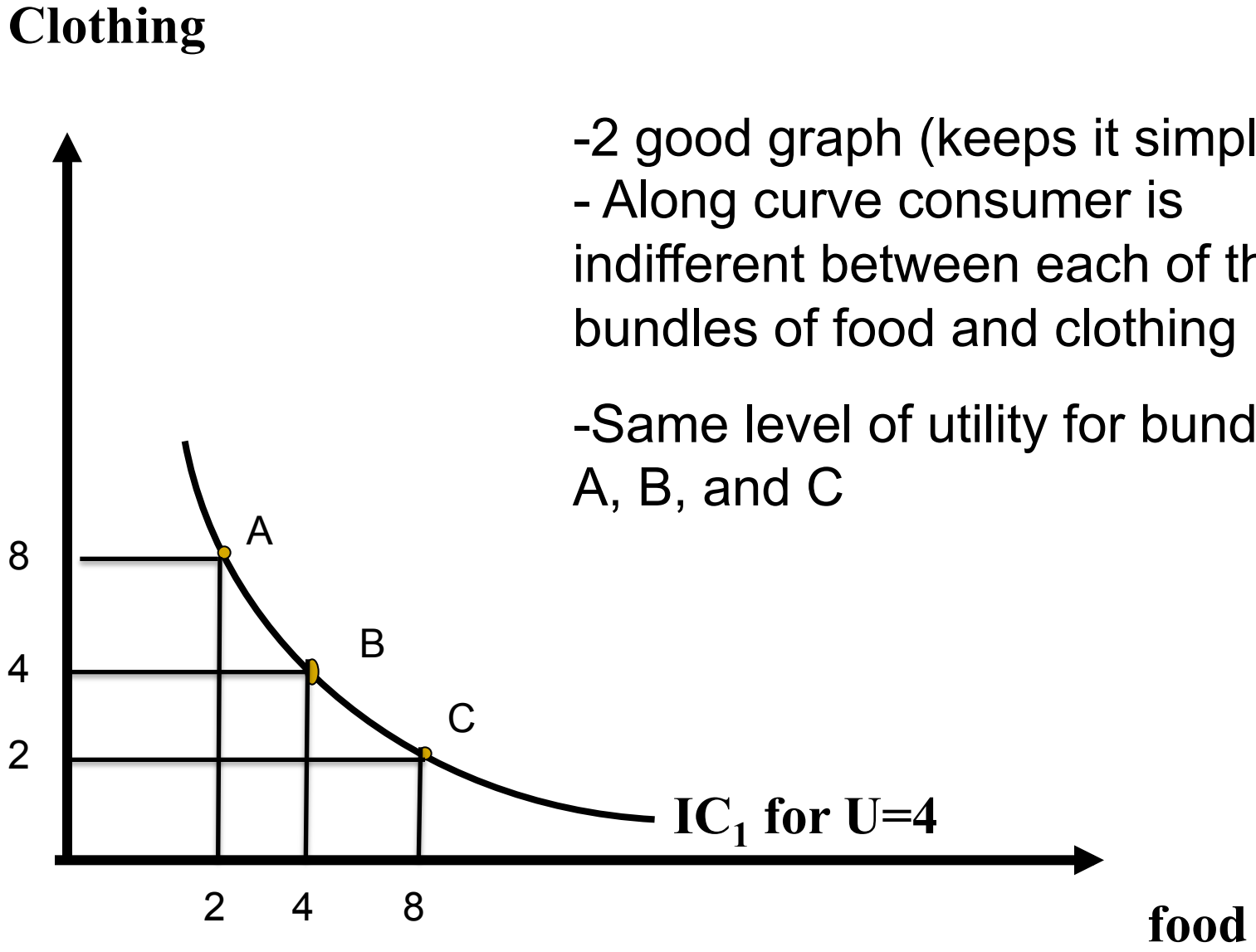
- The **marginal utility**: of a good, x, is the additional utility that the consumer gets from consuming a little more of x when the consumption of all the other goods in the consumer's basket remain constant.

$$\Delta U/\Delta x \text{ (y held constant)} = MU_x = \partial U/\partial x$$

$$\Delta U/\Delta y \text{ (x held constant)} = MU_y = \partial U/\partial y$$

- …or…the marginal utility of x is the slope of the utility function with respect to x.
- The principle of **diminishing marginal utility**: states that the marginal utility falls as the consumer consumes more of a good

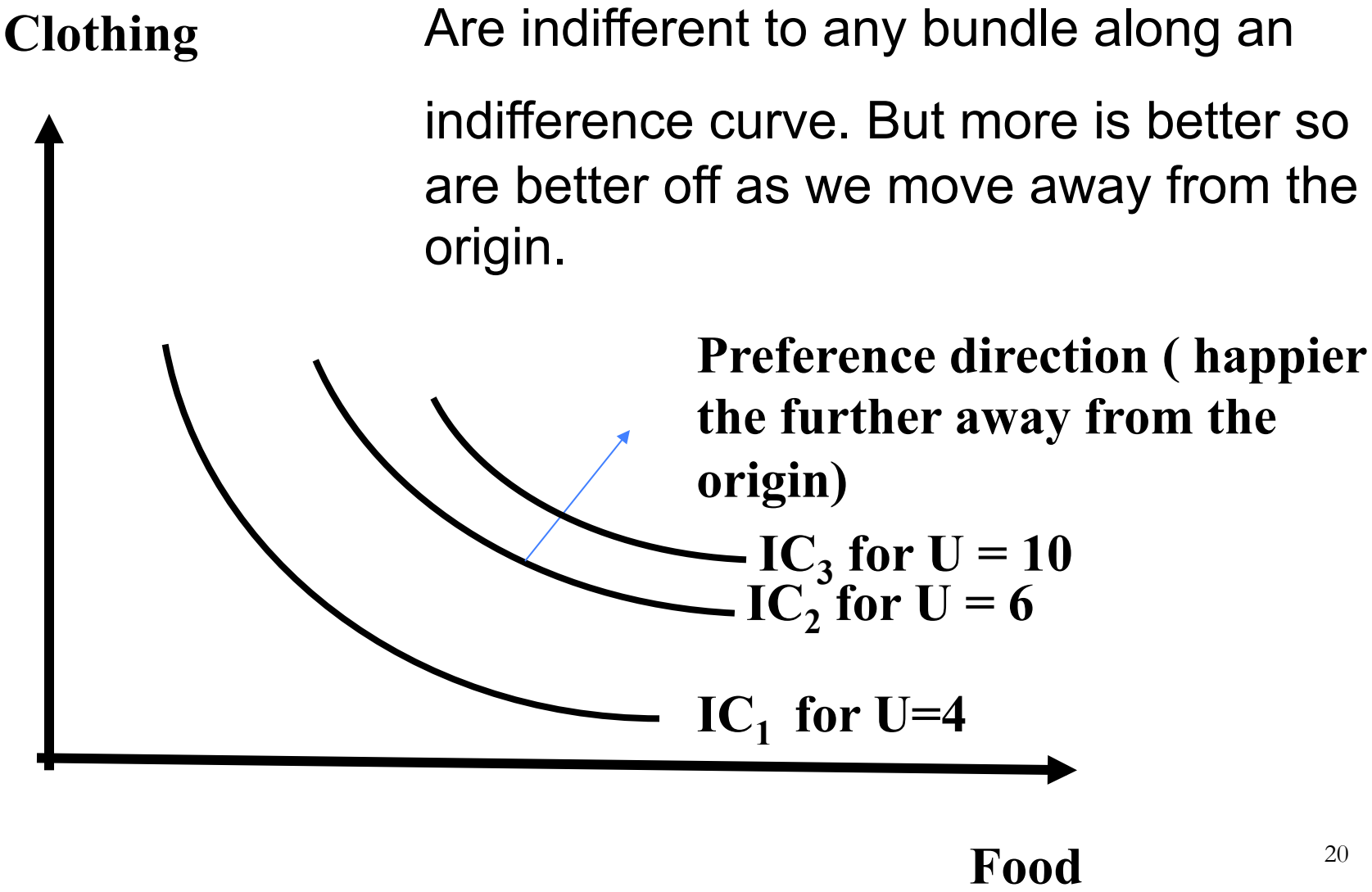
Indifference Curve (IC)



-2 good graph (keeps it simple)
- Along curve consumer is indifferent between each of the bundles of food and clothing

-Same level of utility for bundle A, B, and C

Indifference Map:



Indifference Curves and Map

- An **Indifference Curve** or **Indifference Set:** is the set of all baskets for which the consumer is indifferent

- An **Indifference Map**: illustrates a set of indifference curves for a consumer, it is an ordinal ranking.

Properties of Indifference Maps

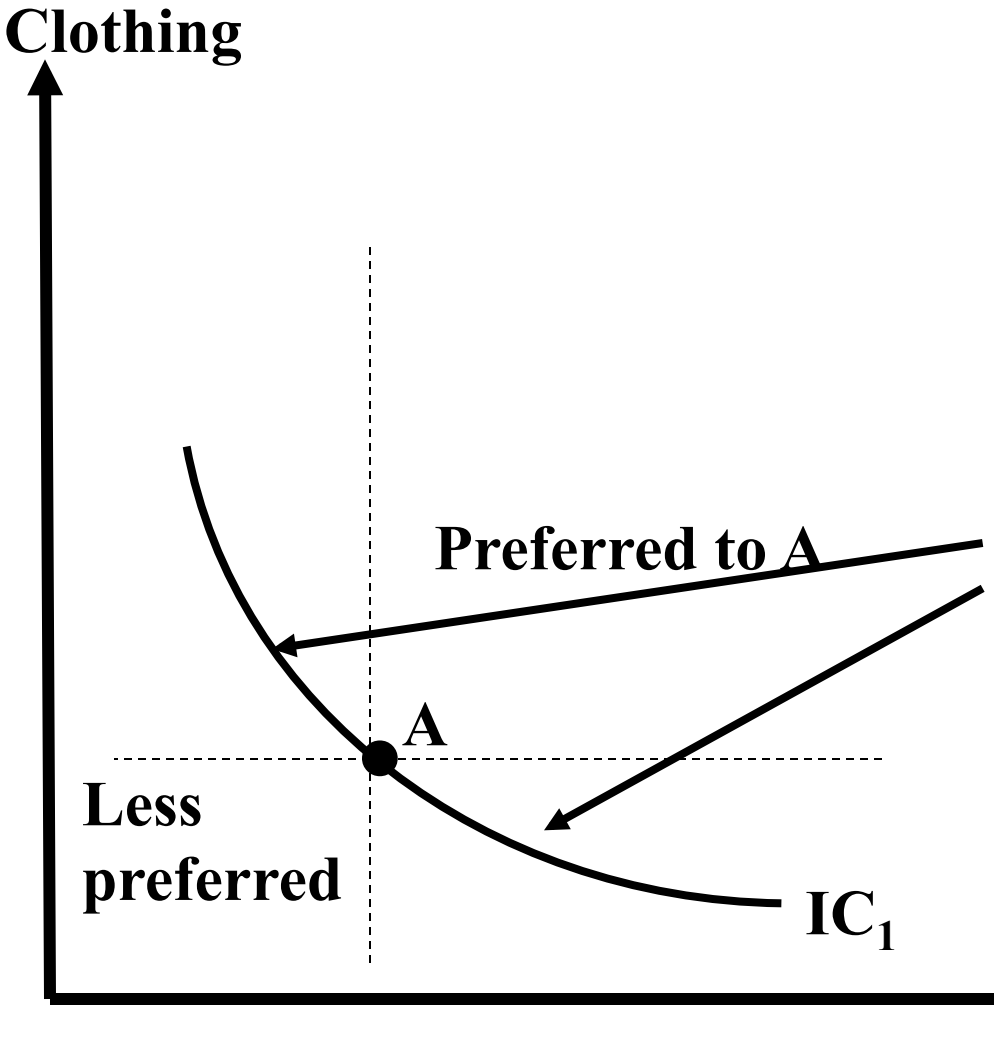
1. **Monotonicity =>** indifference curves have negative slope …and… indifference curves are not "thick"
2. **Transitivity =>** indifference curves do not cross
3. **Completeness =>** each basket lies on only one indifference curve

one more assumption usually is made:

4. **Averages preferred to extremes** => indifference curves are bowed toward the origin (convex to the origin).

Monotonicity

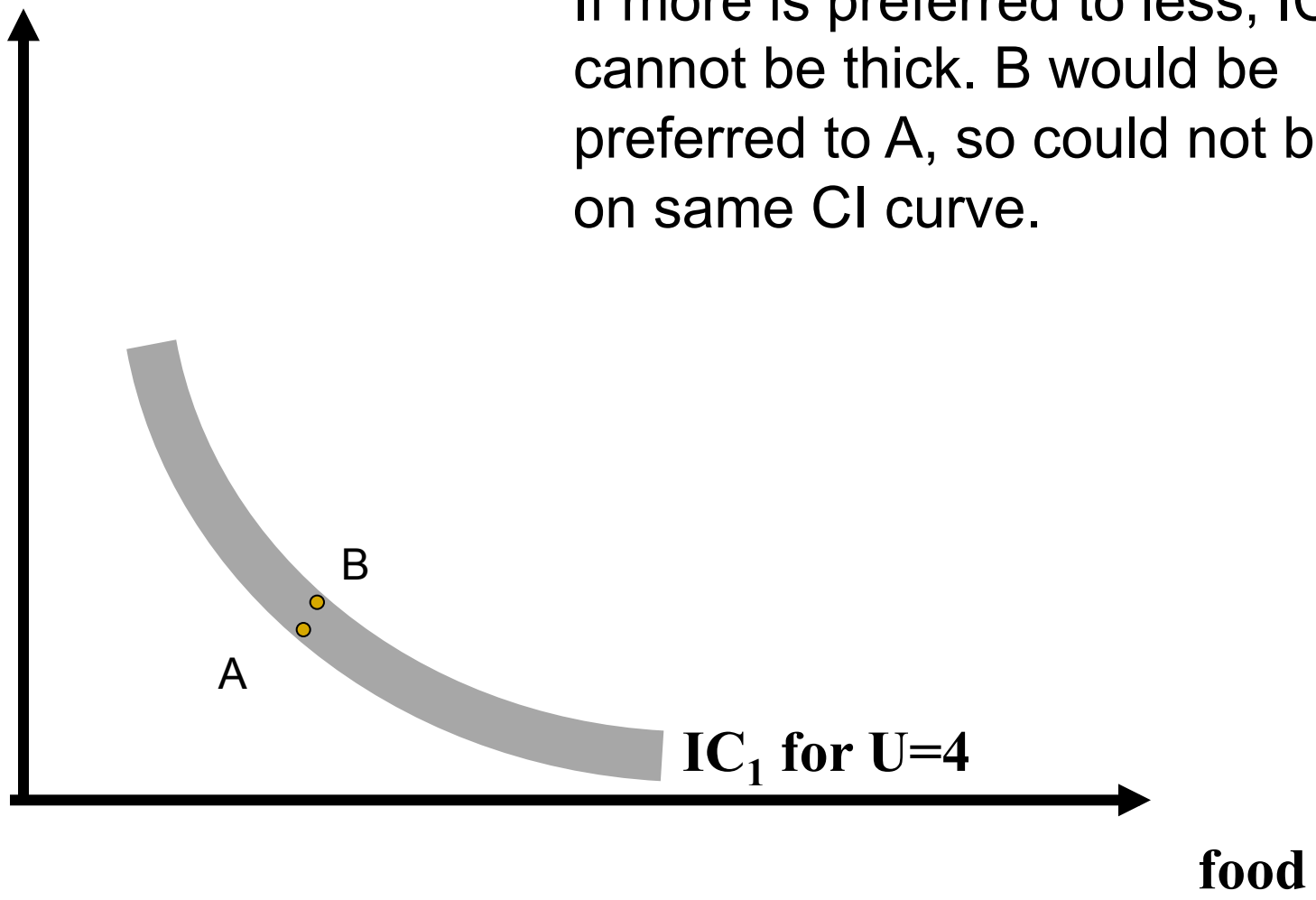
Case: consumers like both goods



To meet monotonicity: preference curve must be in the these areas

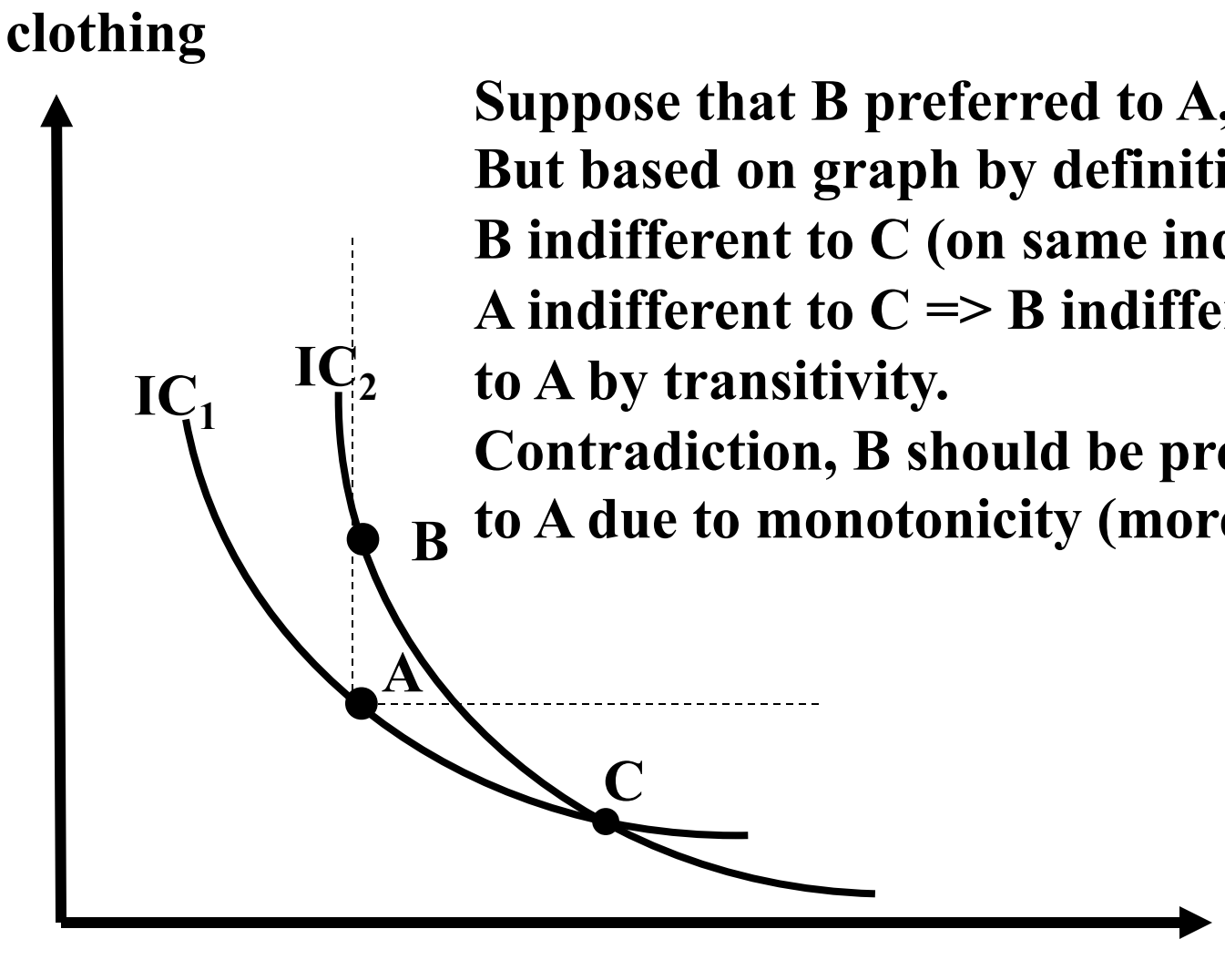
- downward sloping

Monotonicity



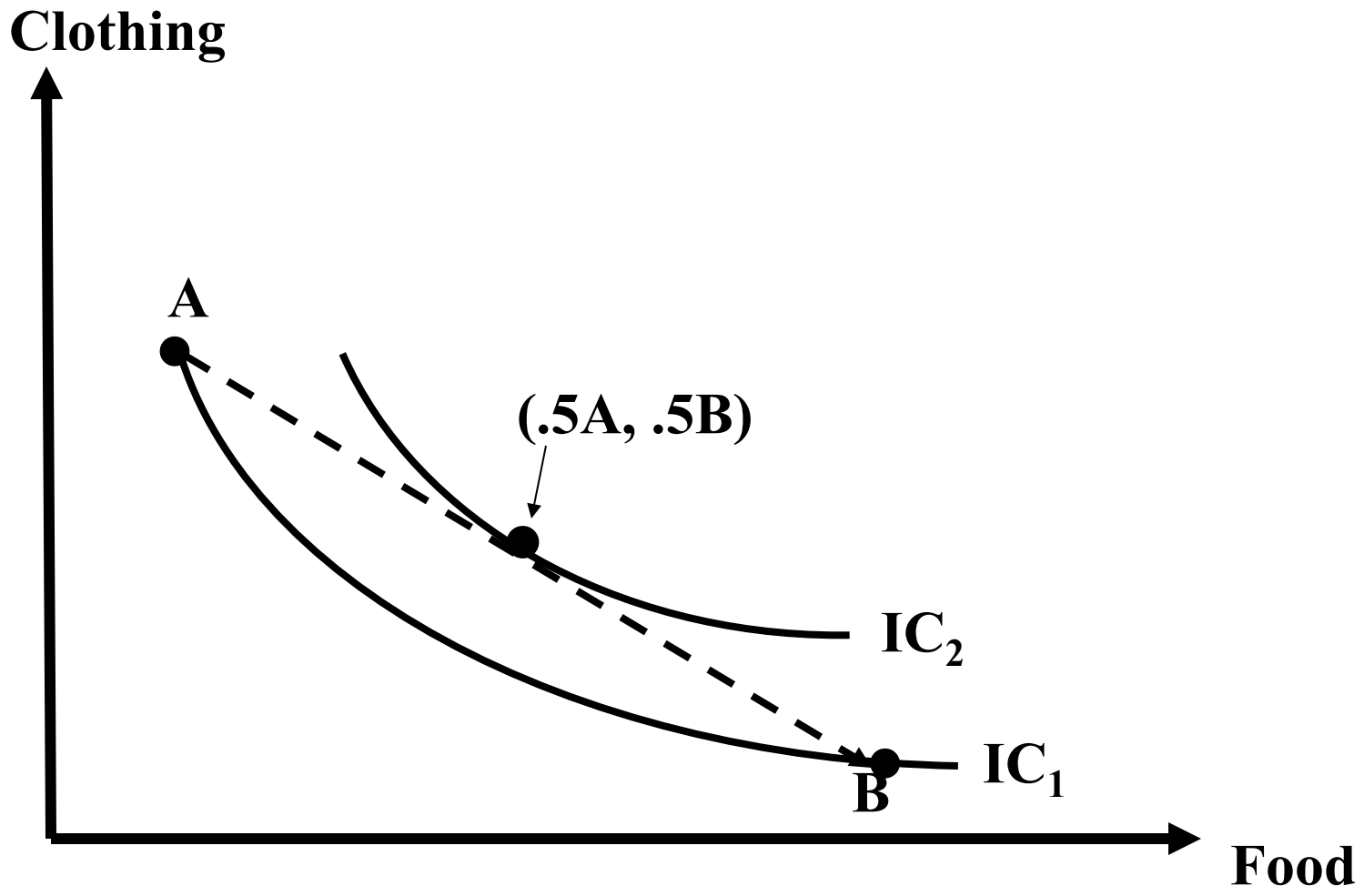
If more is preferred to less, IC cannot be thick. B would be preferred to A, so could not be on same CI curve.

Indifference Curves Cannot Cross



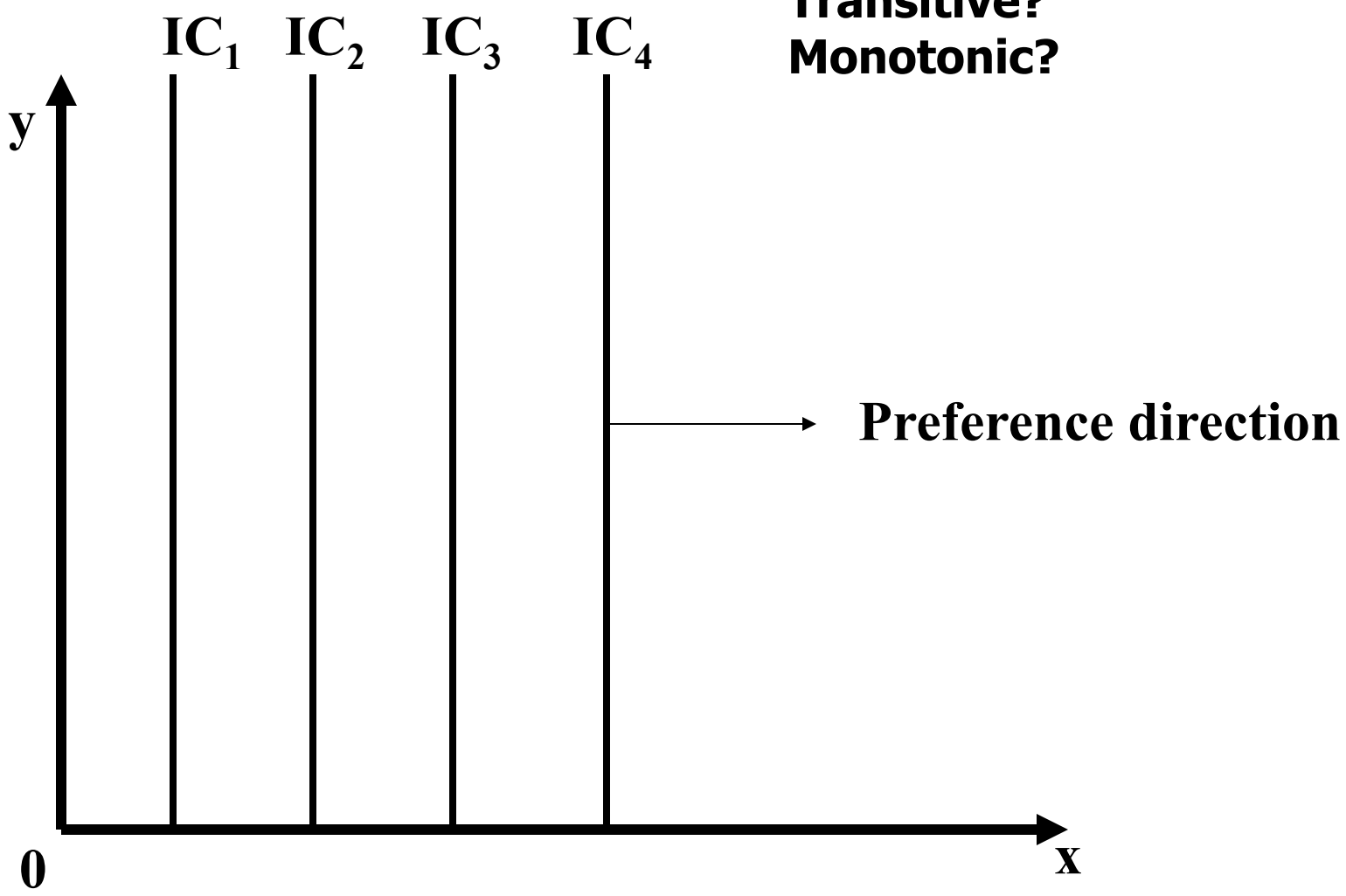
Suppose that B preferred to A, more is better.
But based on graph by definition of IC,
B indifferent to C (on same indifference curve
A indifferent to C => B indifferent
to A by transitivity.
Contradiction, B should be preferred
to A due to monotonicity (more is better).

Averages Preferred to Extremes



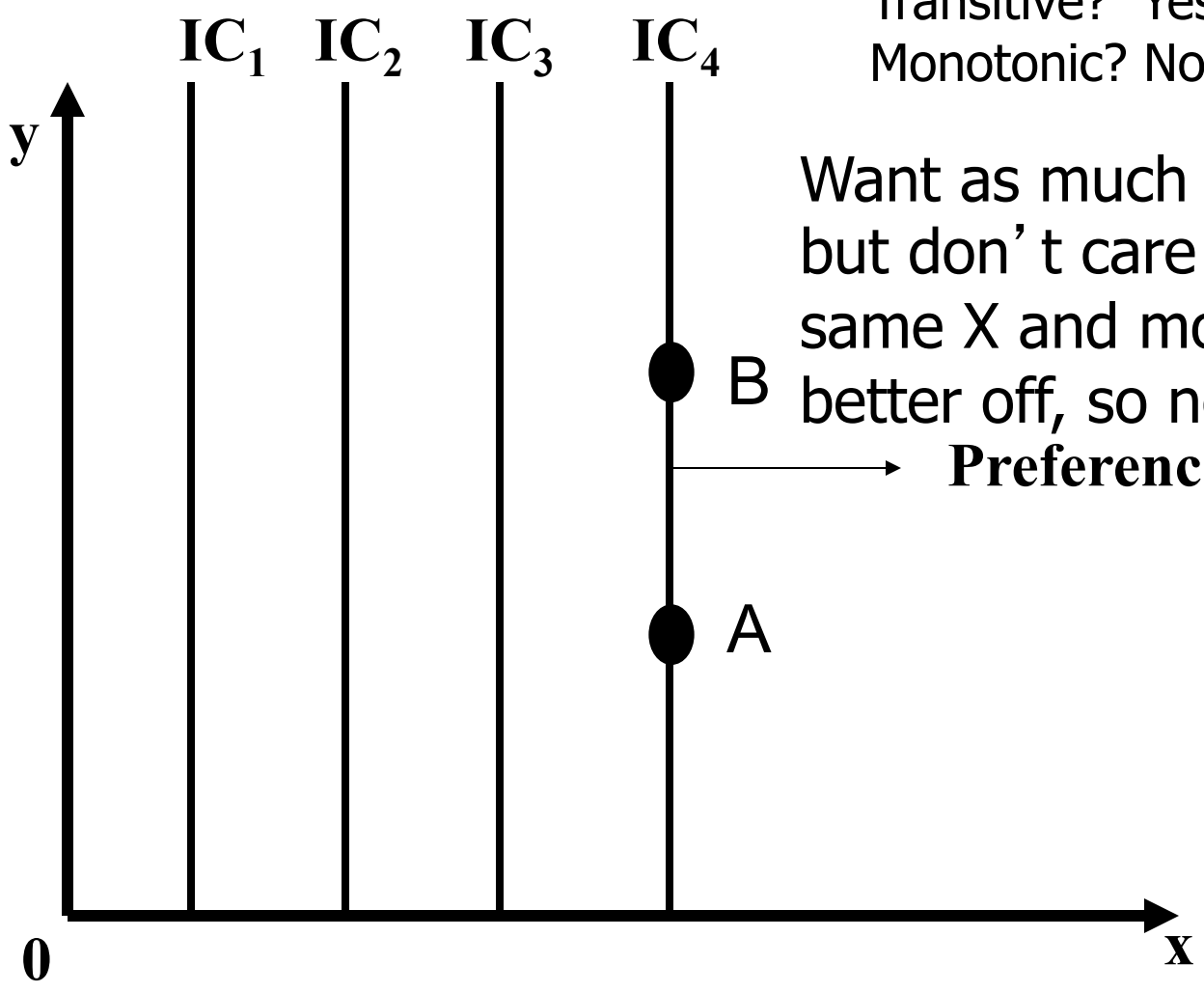
Example: **For the indifference curves graphed below, are the underlying preferences:**

Complete?
Transitive?
Monotonic?



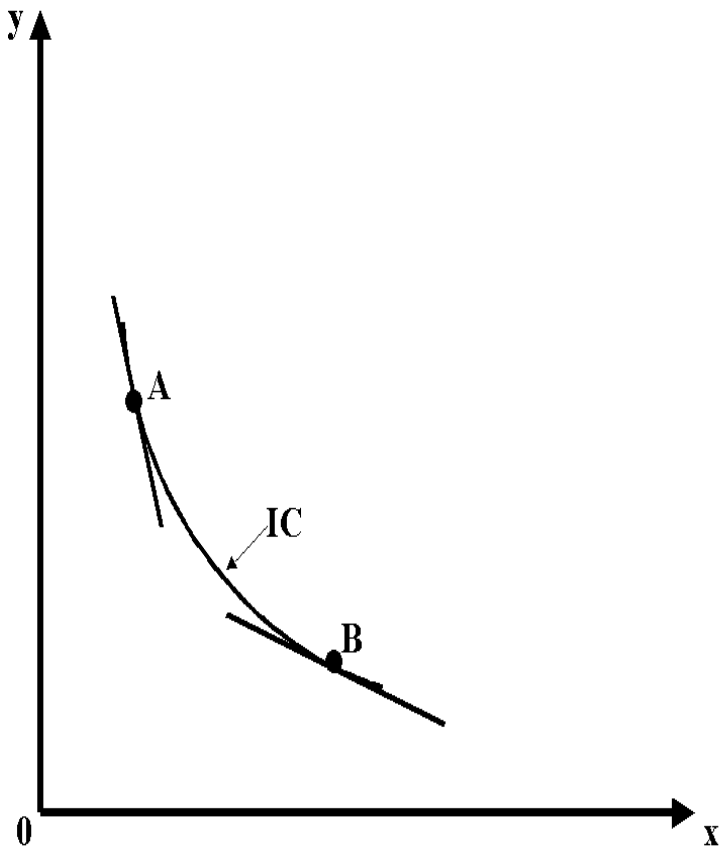
Example: **For the indifference curves graphed below, are the underlying preferences:**

Complete? Yes
Transitive? Yes
Monotonic? No



Want as much X as possible but don't care about Y: So same X and more Y are not better off, so not monotonic.

Reminder Slope of Indifference Curve Graphically – slope of IC



- If you like both goods then both goods will have positive marginal utilities
- Then indifference curve must be negatively sloped, because if you give up one good need more of the other to stay on IC.

Marginal Rate of Substitution

The **marginal rate of substitution:**

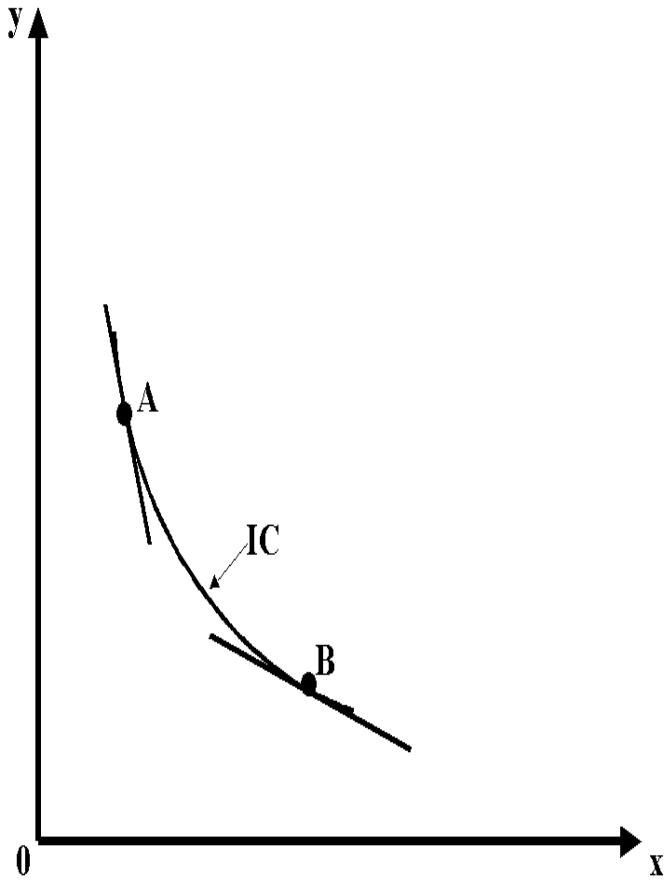
- A consumer's willingness to substitute one good for another while maintaining the same level of satisfaction (i.e. keeping on the same indifference curve)
- The marginal rate of substitution of x for y (MRSx,y) is the rate at which the consumer is willing to give up y in order to get more of x, holding utility constant.
  - This assumes y is on the vertical axis and x the horizontal.

$$MRS_{x,y} = \frac{\Delta y}{\Delta x}$$

- This is the slope of what curve?
  - Slope of the indifference curve at a point

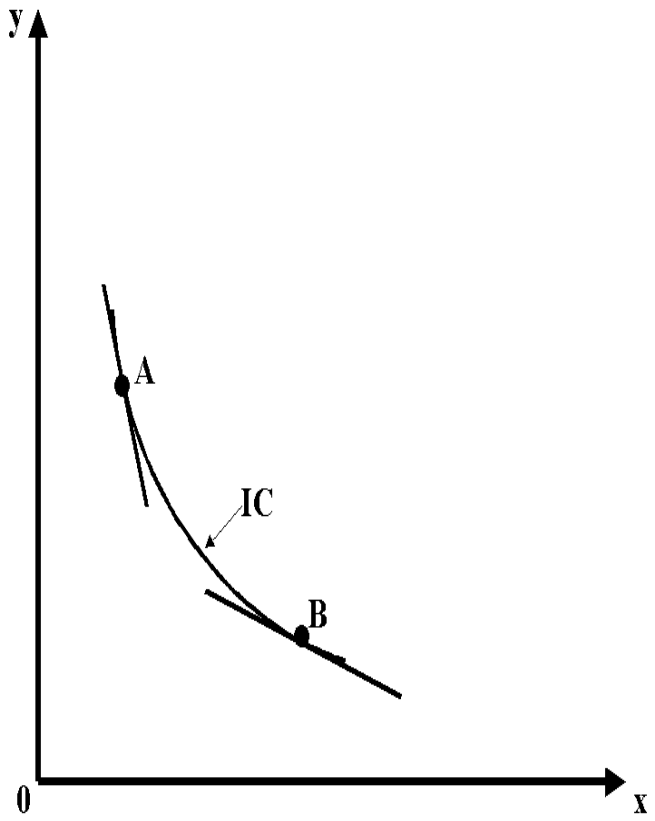
Marginal Rate of Substitution Examples

$$MRSx, y = -\frac{\Delta y}{\Delta x} = -\frac{\partial y}{\partial x} = \frac{5}{1}$$



- At A, slope = -5
- so willing to give up 5 y, for one more X
  - MRS is 5
- At B, slope = -2
- so so willing to give up 2 y, for one more X
  - MRS=2

Diminishing Rate of Marginal Substitution



- As move along x, MRS gets smaller (diminishes)
- For most good MRS is diminishing
  - Curve gets flatter as move along horizontal axis (more X)
- Willing to give up less and less y for same amount of X
  - From A (MRS = 5) to point B (MRS = 2)
- For most goods MRS is diminishing
  - IC are convex to origin
    - Draw them bowed to origin

Diminishing Rate of Marginal Substitution

Another way to talk about it is:

- if the more of good x you have, the more you are willing to give up to get a little of good y…

or…

Marginal Rate of Substitution Mathematical Formula

If U(X,Y), is the utility someone gets from goods X and Y then

$$MRSx,y = -\frac{\Delta y}{\Delta x} = \frac{dy}{dx} = \frac{MUx}{MUy} = \frac{\partial U / \partial X}{\partial U / \partial Y}$$

Memorize or derive it

Marginal Rate of Substitution
Derive Formula – just info not for testing

1.Total Differenentiate utility, this shows how utility changes when X and Y changes

$U(x,y)$ – Totally Differentiate

$$dU = \frac{\partial U}{dx}dx + \frac{\partial U}{dy}dy \text{ OR } \Delta U = \frac{\Delta U}{\Delta x}dx + \frac{\partial U}{dy}dy$$

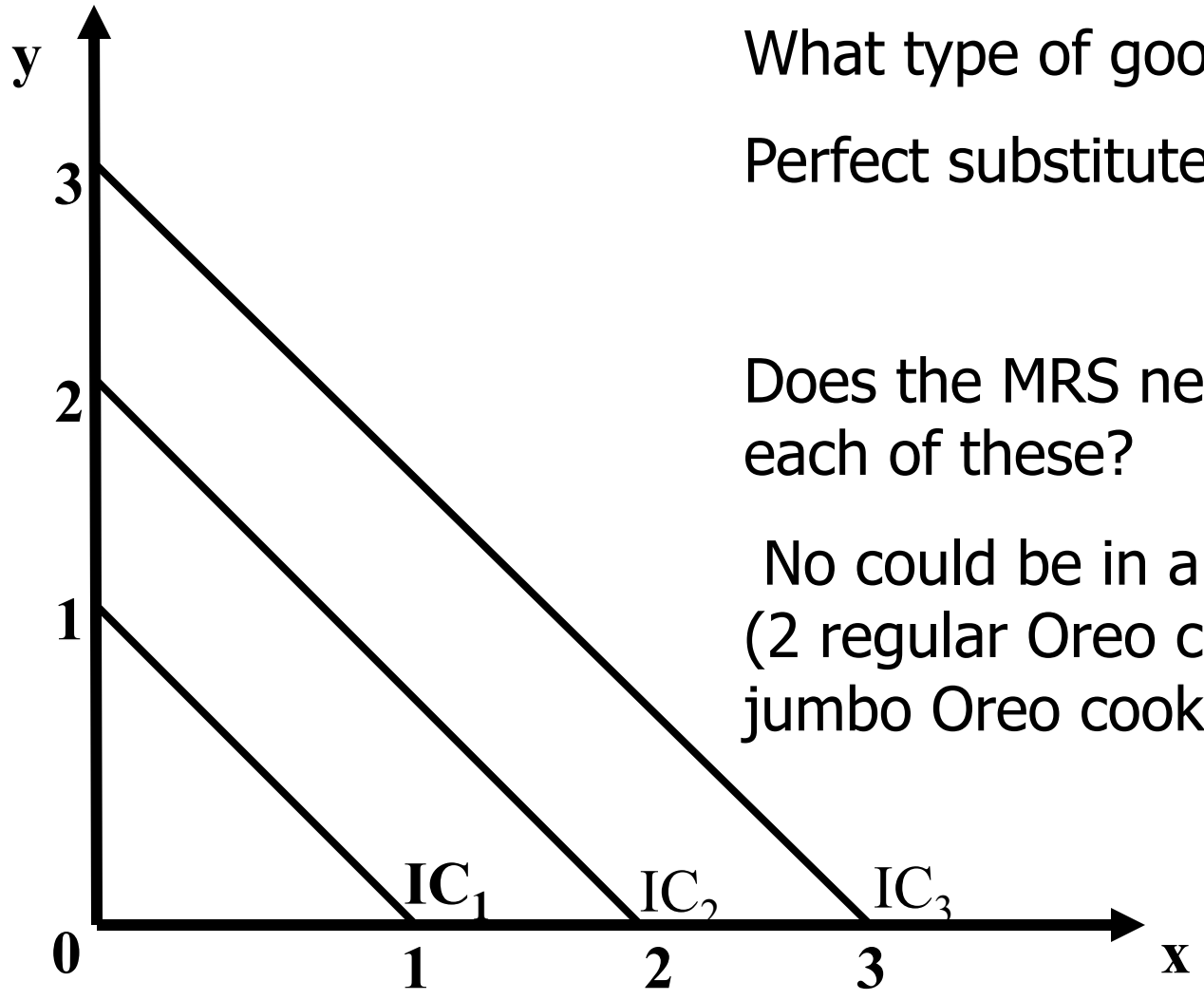
2. With MRS utility doesn't change because move long the indifference curve so dU is zero,

3. Rearrange

$$0 = \frac{\partial U}{dx}dx + \frac{\partial U}{dy}dy$$

$$-\frac{dy}{dx} = \frac{\partial U}{dx} / \frac{\partial U}{dy} = \frac{MUx}{MUy}$$

Example: *For the following indifference curves, what is the marginal rate of substitution between x and y is: 1, .5, 2, or 5? Is the MRS diminishing?*



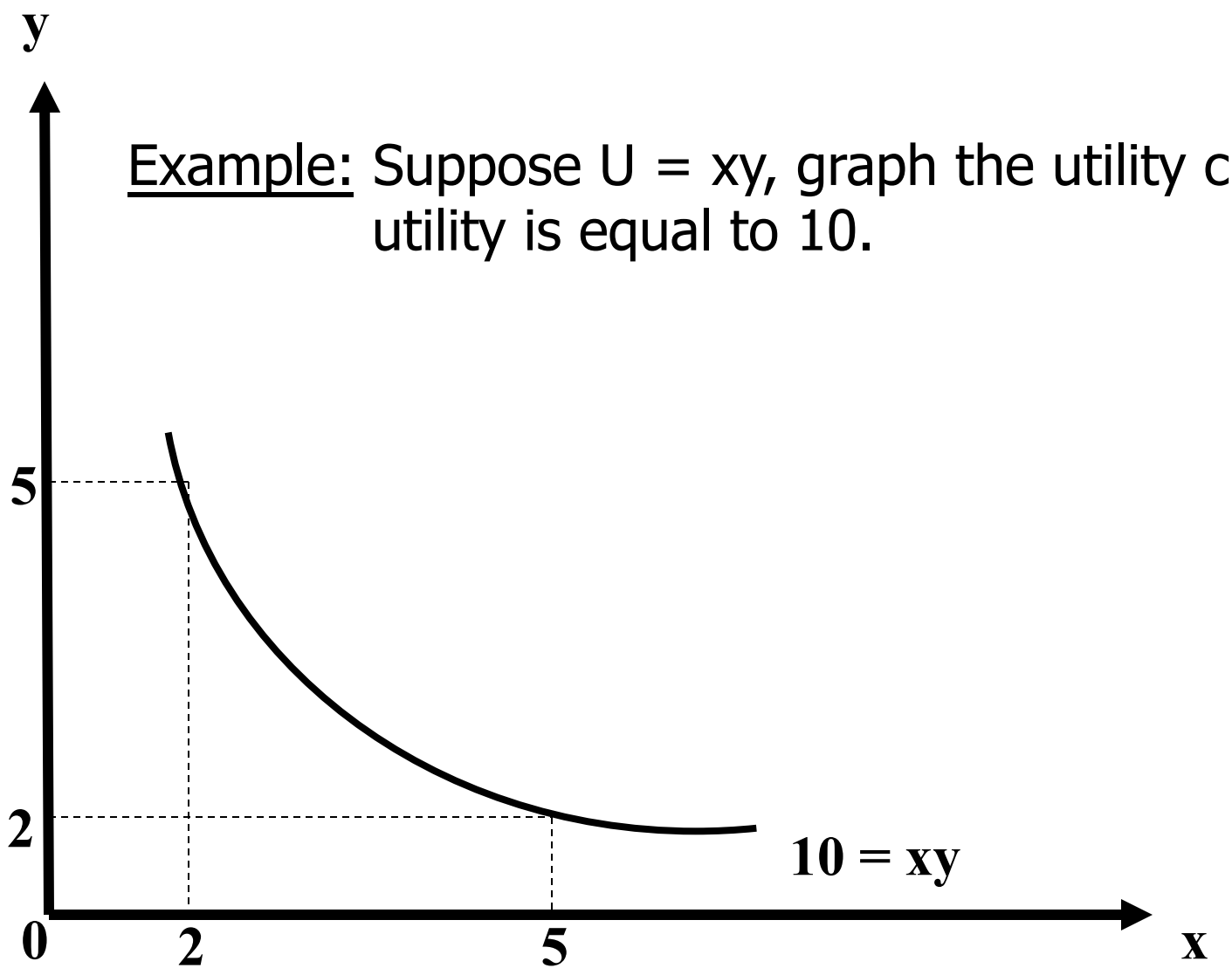
What type of goods are these?

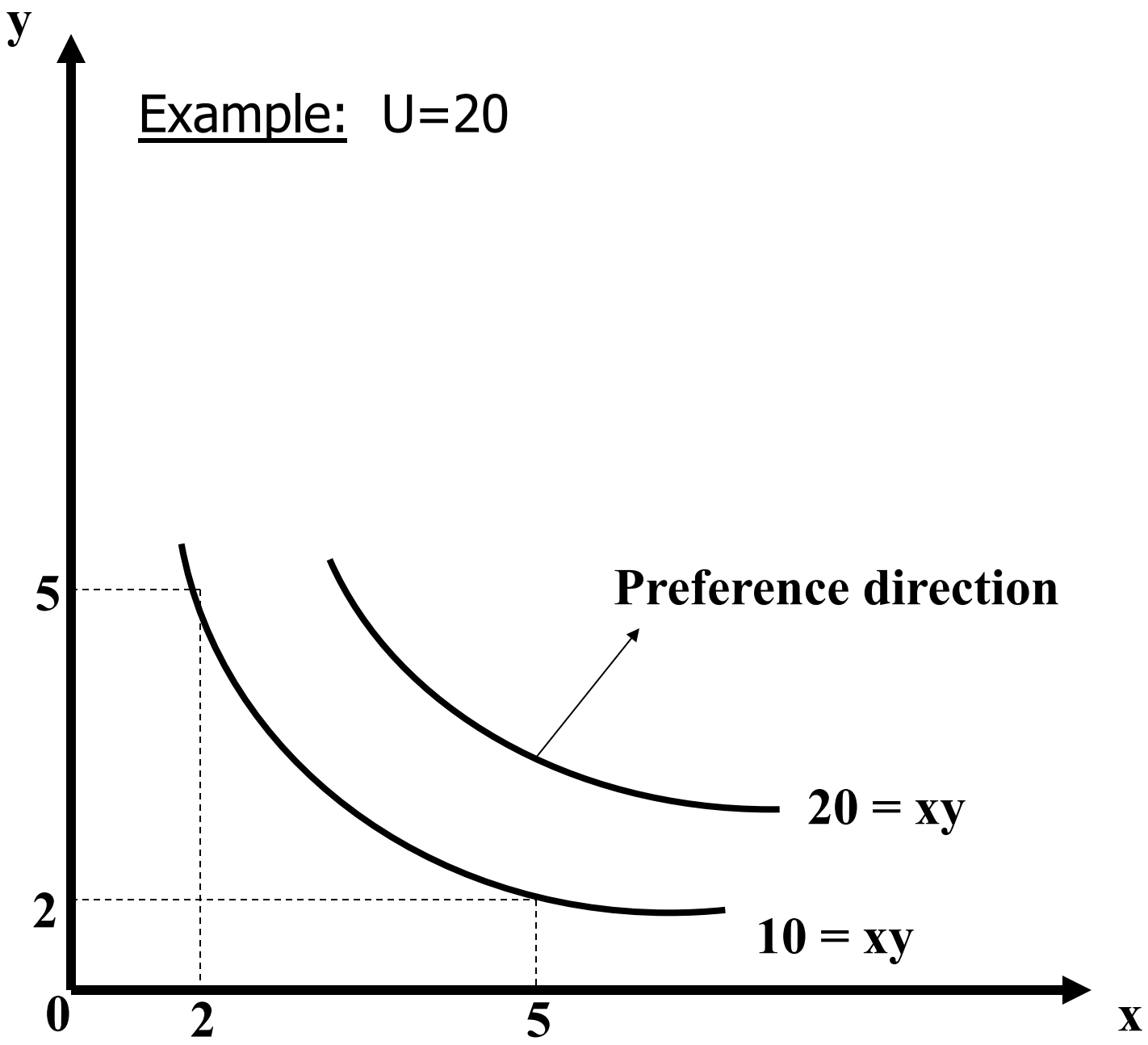
Perfect substitutes

Does the MRS need to be 1 for each of these?

No could be in a ratio of 2 to 1 (2 regular Oreo cookies for one jumbo Oreo cookie

Graphing an Indifference Curve




y
Example: U=20
5
2
0
2
5
x
Preference direction
20 = xy
10 = xy

Marginal Rate of Substitution Mathematical Formula

If U(X,Y), is the utility someone gets from goods X and Y then

$$MRSx,y = -\frac{\Delta y}{\Delta x} = \frac{dy}{dx} = \frac{MUx}{MUy} = \frac{\partial U / \partial X}{\partial U / \partial Y}$$

Memorize or derive it