EC2101
MICROECONOMIC ANALYSIS I

Semester 2 AY 2019/2020

Dr. Zhang Yang

LECTURE 1

COURSE OVERVIEW
CONSTRAINED OPTIMIZATION
PREFERENCE

Part 1

Course Overview

Course Objectives

- Master key concepts and principles in Microeconomic theory
- Develop a set of analytical tools
  - Using graphs, mathematics, and logic to make qualitative and quantitative analysis
- Prepare for more advanced modules

What is Microeconomics?

- Microeconomics studies how individual economic units make decisions
  - Individual economic units
    - consumers, households, workers, firms, etc.
  - Assuming individual economic units seek to maximize their objective function
  - When facing limited resources

Basic Information

- Lecture
  - L1: Thursday 2:00 pm – 4:00 pm, LT8
  - L2: Friday 2:00 pm – 4:00 pm, LT9
- Consultation hours
  - Wednesday 3:00 pm – 5:00 pm
  - Thursday 4:00 pm – 6:00 pm
  - Or by appointment
- Contact
  - AS2-04-36, 6516-6830, zhangyang@nus.edu.sg

Reading

- Textbook
  - Besanko and Braeutigam, *Microeconomics*, 5th edition (international student version), Wiley, 2015 (BB)
  - The 4th edition of the book is also acceptable
  - Solutions to textbook exercises
    - Will not be distributed
- Slides
  - Available on LumiNUS every Wednesday by 2:00 pm

Tentative Course Outline

- Part 1 Consumer Theory
  - Week 1-4, BB: Chapter 3-5
- Part 2 Exchange (General Competitive Equilibrium)
  - Week 5-6, BB: Chapter 16 + additional reading on LumiNUS
- Part 3 Production and Costs
  - Week 8-10, BB: Chapter 6-8
- Part 4 Competitive Markets
  - Week 11-13, BB: Chapter 9-10

EC2101 and EC1101E/EC1301

- EC1101E/EC1301
  - Introductory level
  - Focus on knowing basic concepts
  - Limited mathematics
- EC2101
  - Intermediate level
  - Focus on understanding economic models
  - Uses calculus

EC2101 and EC3101

- Think of EC2101 and EC3101 as one big course
  - EC2101 covers first half
    - Consumer theory
    - Producer theory
    - Competitive markets
  - EC3101 covers second half
    - Advanced topics in consumer theory
    - Monopoly and oligopoly markets
    - Game theory
    - Uncertainty and asymmetric information

Blended Learning

- Blended learning means
  - Face-to-face lecturing + online learning
- Blended lectures
  - Lecture 1 (week 1, optional)
  - Lecture 3 (week 3)
  - Lecture 9 (week 10)
  - Lecture 12 (week 13)

What are you supposed to do for a blended lecture?

Normal Lectures

- Come to class
- Work on tutorial questions
- Come to tutorial

Blended Lectures

- *Watch the pre-lecture video*
  - *10-20 minutes*
- *Take the pre-lecture quiz*
- Come to class
  - *Participate in in-class exercises via Poll Everywhere*
- Work on tutorial questions
- Come to tutorial

Other In-Class Activities

- Fill in the blanks
  - There are some blanks in the lecture notes to be filled in during lecture
- Concept checks
  - A few questions will be given at the beginning/end of some lectures to gauge your understanding
  - Participate via Poll Everywhere

Use of LumiNUS

- Announcement
- Files
- Forum
- Gradebook
- Multimedia
  - Pre-lecture videos
- Quiz
  - Pre-lecture quizzes
- Web lectures
  - Webcasts

Grading

- Pre-Lecture LumiNUS Quiz 5%
- Homework 15%
- Participation (tutorial) 10%
- Midterm 25%
  - Closed-book
- Final 45%
  - Cumulative, closed-book

Pre-Lecture LumiNUS Quiz

- There are 3 graded quizzes
  - Quiz 1 is optional and not graded
  - Quiz 2 – 4 are graded
- Each quiz contains a few multiple choice questions
- The quizzes test your understanding of the pre-lecture videos
- Grading
  - 3 attempts are allowed for each quiz
  - Only the highest score will be recorded
  - No extension of deadline

Homework

- Two group homework
  - Homework 1 due 17 February at 2 pm
  - Homework 2 due 6 April at 2 pm
- Each group only needs to submit one copy
- Submit on time to my mailbox
- Late homework policy
  - 25% of marks will be deducted for each day past the due date

Homework Groups

- Why group homework?
  - Makes discussion legitimate
  - Forming studying groups is an effective way to learn
- Form a group of 2-3 with your classmates from the same tutorial
- If you really really do not want to work in a group
  - You have the option of doing individual homework
- Let you tutor know your choice and group members by tutorial 2 (week 4)
- Be a responsible group member!!!

Tutorials and Practice Problems

- Tutorials start from week 3
  - No tutorial in week 7 (midterm week)
- Practice problems will be assigned after each lecture
  - Starting from week 2
- Solutions to practice problems discussed in tutorials
  - Students present the solutions
  - Written solutions will be posted on LumiNUS
- Additional questions will be discussed if time permits

Grading of Participation

- Participation graded by tutorial presentations and general participation in tutorials
- Presentation (5%)
  - Each student presents once (only the first presentation will be graded)
  - Graded based on effort
    - Not on correctness
- General participation (5%)
  - Attendance
  - Participation in tutorial discussions
  - Volunteer to present more than once

A Few Words on Presentations

- Students volunteer for presentations
  - Your tutor may call someone to present if no one volunteers
- How to present?
  - Not the same as simply writing down your answer on the board
  - You need to explain!
  - When you present, you are the teacher and you are responsible for your classmates' learning

Exams

- Midterm
  - 3 March evening
  - Makeup midterm offered to students with conflicting schedules
    - 5 March and/or 6 March at regular lecture hours
    - Need to register for makeup midterm in advance
- Final
  - 28 April 9:00 am to 11:00 am
  - No makeup final will be offered

Public Holiday and Rescheduling

- 24 January (Friday)
  - Eve of Chinese New Year
  - No class after 2 pm
- 27 January (Monday)
  - Chinese New Year
  - W1-W6 to be rescheduled
- 10 April (Friday)
  - Good Friday
  - L2 to be rescheduled

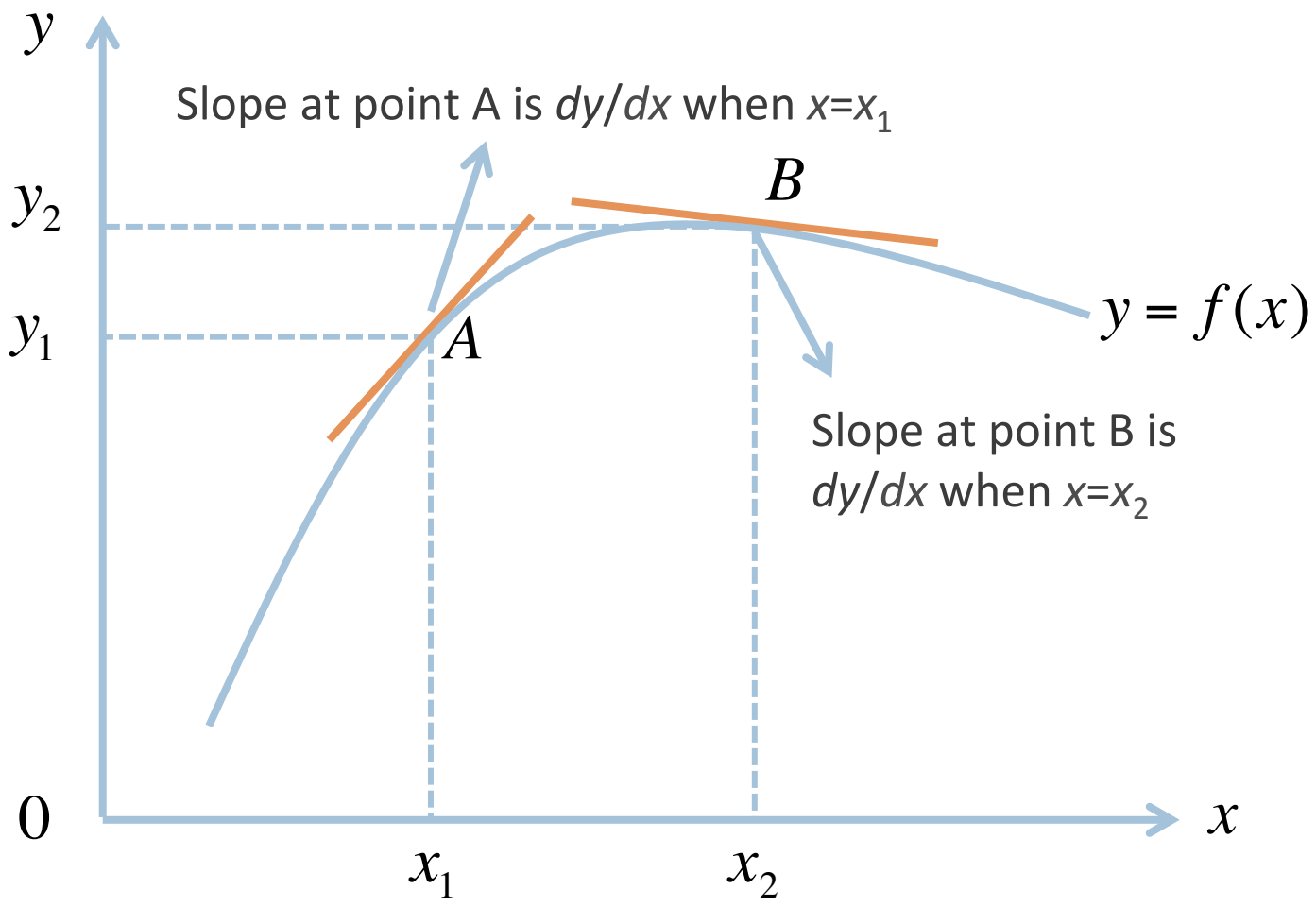
A Few More Things

- Attendance of tutorials
  - Will be taken
  - Inform your tutor if you have to miss a tutorial and try to go for a makeup
- Past-year questions and questions from other sources
  - Will not be discussed

Part 2

Constrained Optimization

Review: Derivative and Slope



Positive derivative: the curve is upward sloping

Negative derivative: the curve is downward sloping

Unconstrained Optimization with One Variable

- What is the maximum of the following function?

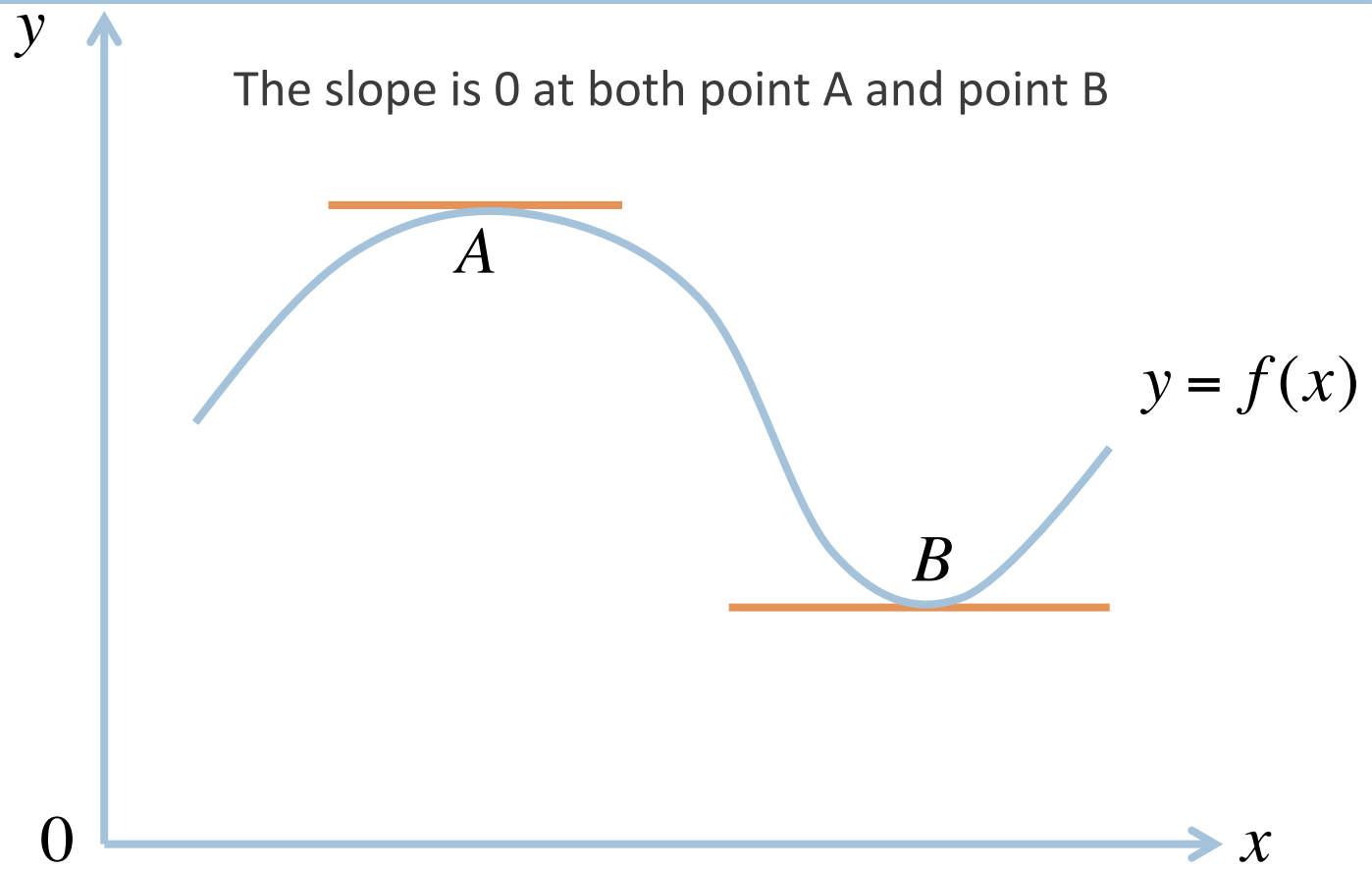
$$y = -x^2 + 2x + 10$$

- At the maximum, the slope of the function must be 0 – *the first-order condition*

$$\frac{dy}{dx} = -2x + 2 = 0$$

- At the maximum, x=1
- The maximum value of y is 11

Maximum vs. Minimum



Second-Order Condition

- At the maximum,

$$\frac{d^2y}{dx^2} \leq 0$$

- Using our earlier example,

$$\frac{d^2y}{dx^2} = \frac{d(-2x+2)}{dx} = -2$$

- At the minimum,

Unconstrained Optimization with Two Variables

- Suppose you want to find the maximum of

$$f(x,y) = -x^2 + 2x - y^2 + 4y + 5$$

- Same idea – two first-order conditions

$$\frac{\partial f}{\partial x} = -2x + 2 = 0$$

$$\frac{\partial f}{\partial y} = -2y + 4 = 0$$

- The function reaches its maximum when x=1 and y=2, and the maximum is 10

Constrained Optimization

- Suppose you still want to find the maximum of the same function
- However, now you need to satisfy another equation

$$x + y = 1$$

- This is a *constrained maximization* problem
  - The *objective function* is

$$f(x, y) = -x^2 + 2x - y^2 + 4y + 5$$

  - The *constraint* is

$$x + y = 1$$

Lagrange Multiplier Method

- We first rewrite the constraint as

$$1 - x - y = 0$$

- We then construct the *Lagrangian function*

$$\Lambda(x, y, \lambda) = -x^2 + 2x - y^2 + 4y + 5 + \lambda(1 - x - y)$$

- The new unknown λ is the *Lagrange multiplier*
- To find the solution to the constrained maximization problem, we just need to maximize the Lagrangian function

Lagrange Multiplier Method Cont'

- There are three first-order conditions,

$$\frac{\partial \Lambda}{\partial x} = -2x + 2 - \lambda = 0$$

$$\frac{\partial \Lambda}{\partial y} = -2y + 4 - \lambda = 0$$

$$\frac{\partial \Lambda}{\partial \lambda} = 1 - x - y = 0$$

- Solving for the three equations, we have

$$x = 0, \quad y = 1, \quad \lambda = 2$$

- The maximum value of the function is 8

General Form of the Lagrange Multiplier Method

- The constrained optimization problem is

$$\max_{x,y} \quad f(x,y)$$

$$s.t. \quad g(x,y) = 0$$

  - $f(x,y)$ is the objective function
  - $g(x,y)$ is the constraint
- The Lagrangian function is

$$\Lambda(x,y,\lambda) = f(x,y) + \lambda g(x,y)$$

General Form of the Lagrange Multiplier Method Cont'

- To find the maximum, we derive the first-order conditions

$$\frac{\partial \Lambda}{\partial x} = \frac{\partial f(x,y)}{\partial x} + \lambda \frac{\partial g(x,y)}{\partial x} = 0$$

$$\frac{\partial \Lambda}{\partial y} = \frac{\partial f(x,y)}{\partial y} + \lambda \frac{\partial g(x,y)}{\partial y} = 0$$

$$\frac{\partial \Lambda}{\partial \lambda} = g(x,y) = 0$$

- Use the three equations for the three unknowns

Part 3

Preference

Key Questions in Consumer Theory

- Consumer choice
  - How do consumers choose what to buy and how much to buy?
- Demand function
  - How do consumers' choices change with prices and income?
- Consumer welfare
  - How to measure the gain/loss to consumers when prices change?

Consumer Choice: How do consumers make decisions?

- Basic assumptions
  - Consumers are rational
    - Specifically, consumers maximize utility
  - Consumers face budget constraints
  - Consumers are fully informed
- What do consumers like?
  - Preference
- Prices and income
  - Budget constraint

Preference

- How do consumers rank two goods?
- Definition 1.1 A consumer *(strictly) prefers* A to B
  - If the consumer is more satisfied with A than with B
  - We use the notation $A \succ B$
- Definition 1.2 A consumer is *indifferent* between A and B
  - If the consumer is equally satisfied with A or B
  - We use the notation $A \approx B$
- Preference is not the same as choice
  - Preference does not change with prices or income

Consumption Basket

	Food	Clothing	All others
Basket 1	40 units	20 units	10 units
Basket 2	50 units	10 units	20 units
Basket 3	30 units	30 units	15 units

- For simplicity, assume a *consumption basket* consists of two goods
  - For example, food and clothing

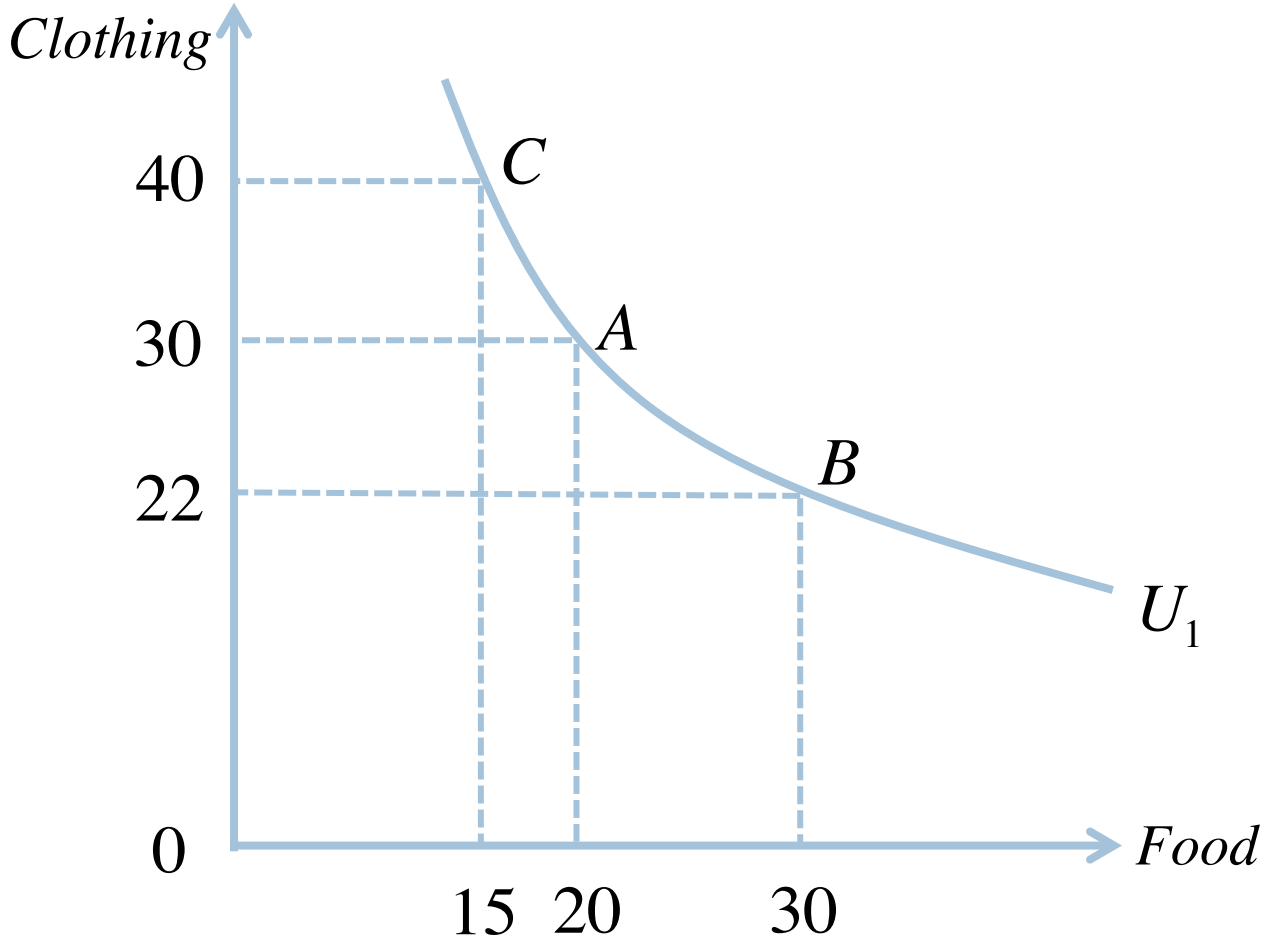
Fundamental Assumptions on Preference

- Completeness
  - For any two baskets A and B
  - Either $A \succ B$
  - Or $B \succ A$
  - Or $A \approx B$
- Transitivity
  - If $A \succ B$ and $B \succ C$, then $A \succ C$
  - Similarly, if $A \succ B$ and $B \approx C$ then $A \succ C$

How to represent preference in graph?

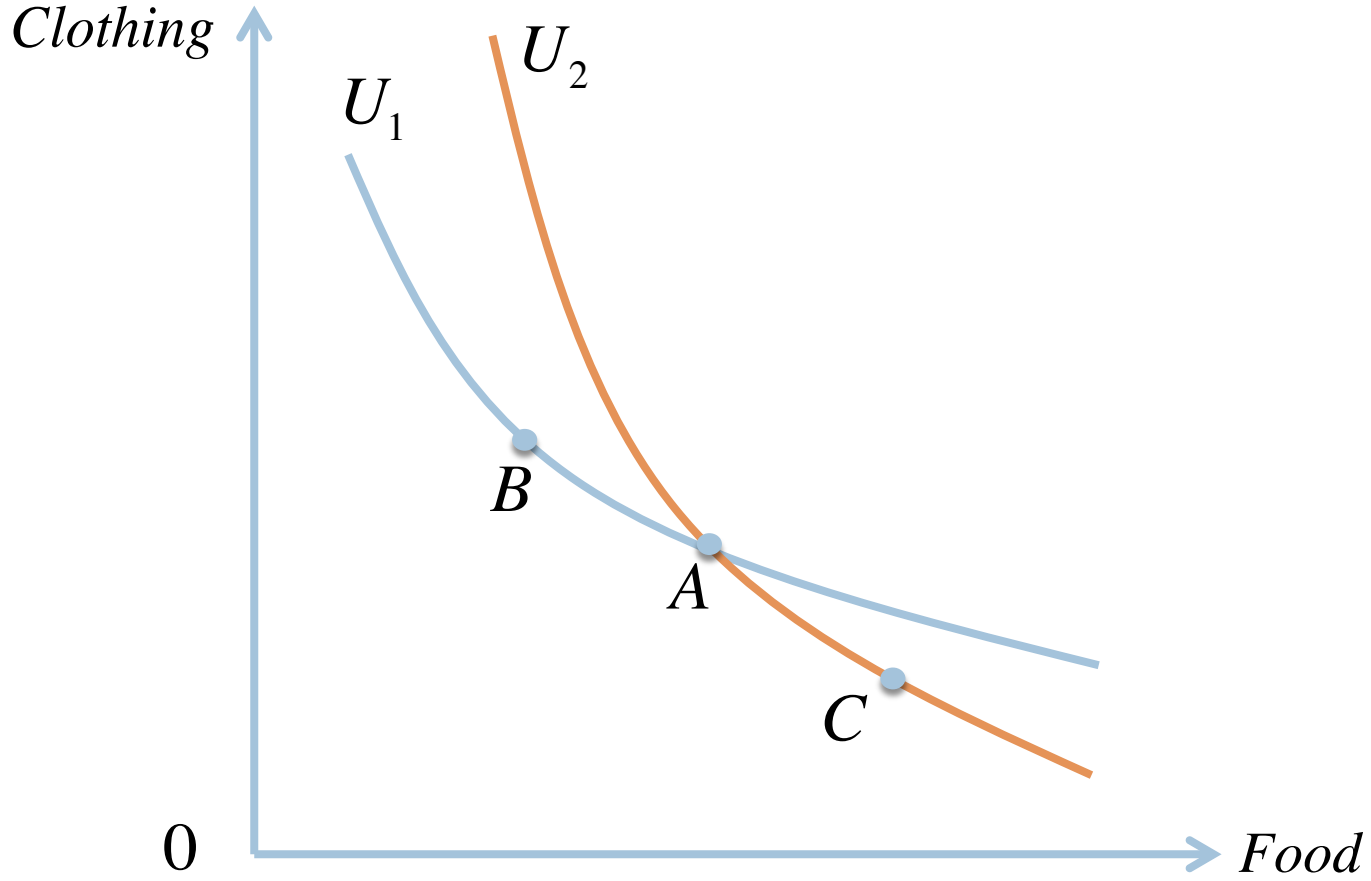
- Suppose a consumer is indifferent between
  - A: 20 units of food + 30 units of clothing
  - B: 30 units of food + 22 units of clothing
  - C: 15 units of food + 40 units of clothing

Indifference Curve



Definition 1.3 An *indifference curve* connects all consumption baskets that give consumer the same level of satisfaction

Indifference curves do not cross!

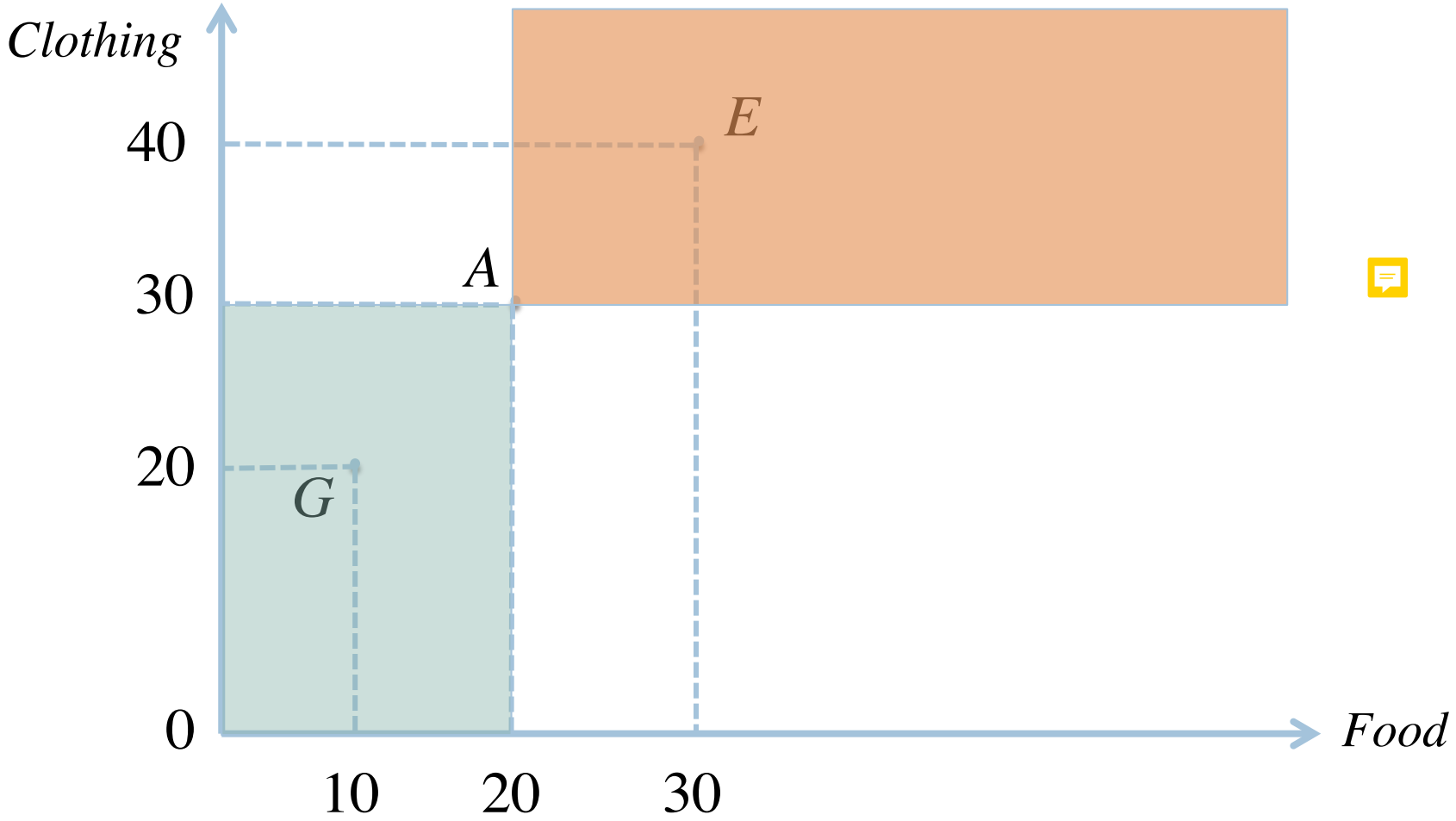


Since A=B and A=C
By transitivity, B=C

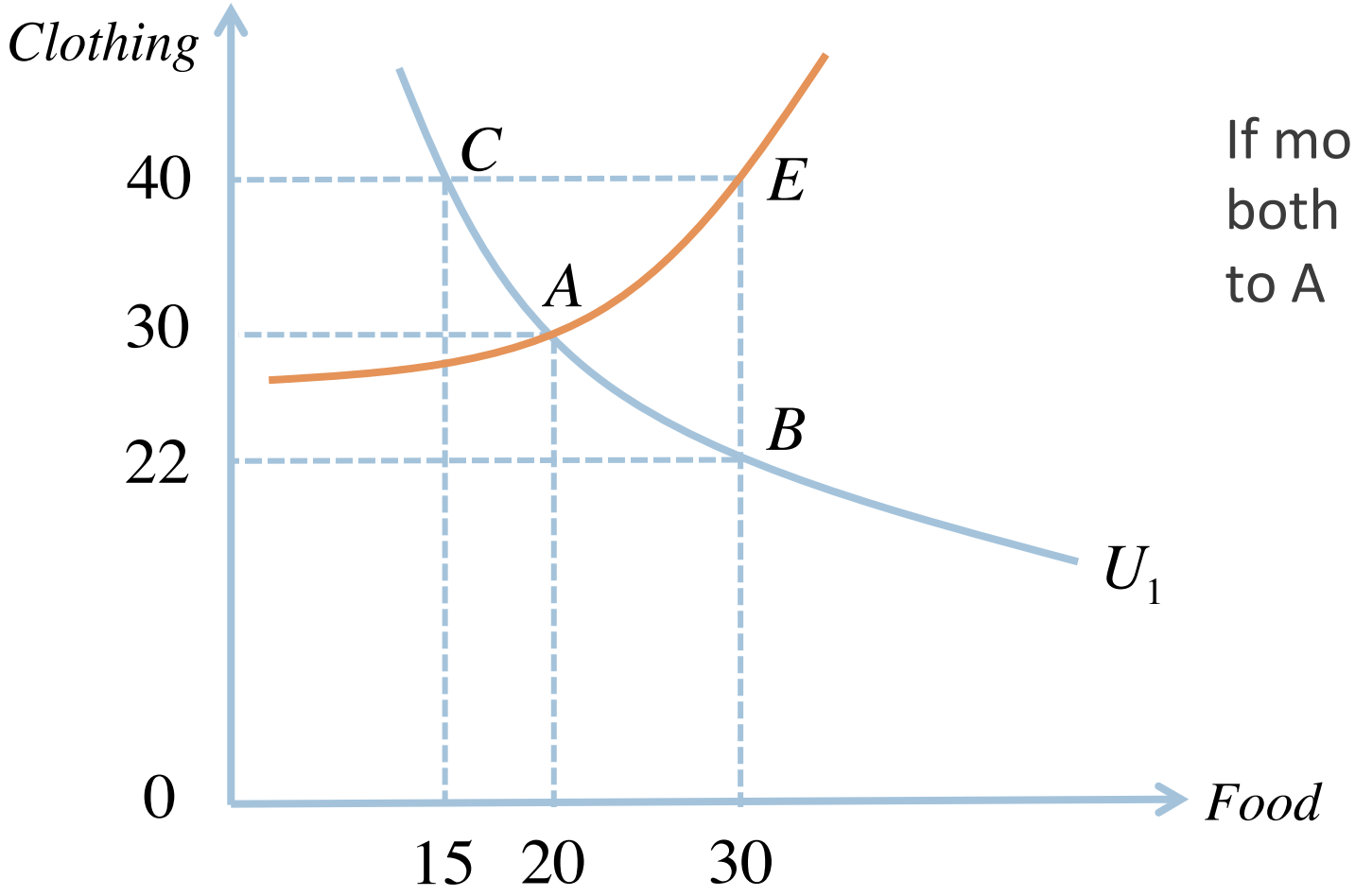
Another Common Assumption on Preference

- If “more is better” is satisfied for a good
  - Consumer likes the good
  - Consuming more increases satisfaction level
- For example, if “more is better” is satisfied for both food and clothing
  - 20 units of food + 30 units of clothing preferred to 19 units of food +30 units of clothing
  - 20 units of food + 30 units of clothing preferred to 20 units of food + 26 units of clothing
  - 20 units of food + 30 units of clothing preferred to 18 units of food + 28 units of clothing

Which baskets are preferred/less preferred to A?

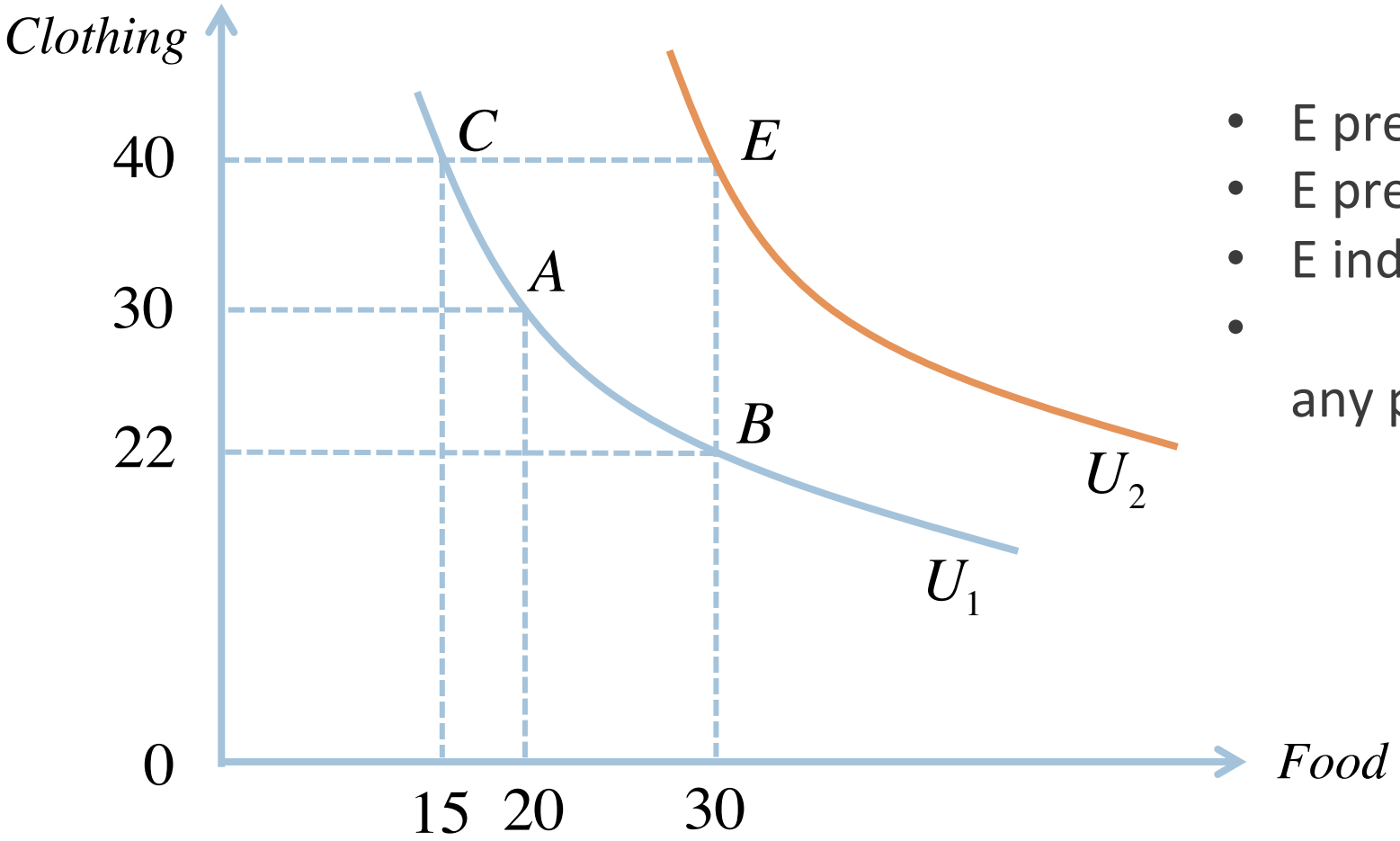


Indifference Curves are Downward Sloping when Consumer Likes Both Goods



If more is better is satisfied for both goods, E should be preferred to A

Direction of Preference when Consumer Likes Both Goods



- E preferred to A
- E preferred to
- E indifferent to any point on U_2
- preferred to any point on U_1

Summary on Three Assumptions

- We always assume
  - Completeness
  - Transitivity
- "More is better" may be violated
  - E.g., Shin-chan hates "bell pepper" but likes "hamburger"
    - "More is better" not satisfied for bell pepper
    - More bell pepper, lower satisfaction