# Microeconomics Class 1

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Text Book

Pindyck, Robert S. and Daniel L. Rubinfeld, **Microeconomics**, Pearson International, 7th edition.

We will cover most of:

- Chapter 3: Consumer behaviour.
- Chapter 4: Individual & market demand.
- Sections 7.1-7.2: The cost of production.
- Chapter 8: Profit maximization & supply.
- Chapter 9: Welfare & surplus analysis of competitive markets.
- Chapter 10: Monopoly and monopsony.
- Chapter 11: Market power and price discrimination.
- Chapter 12: Monopolistic Competition and Oligopoly

Pearson International Edition

MICROECONOMICS

ROBERT S. PINDYCK
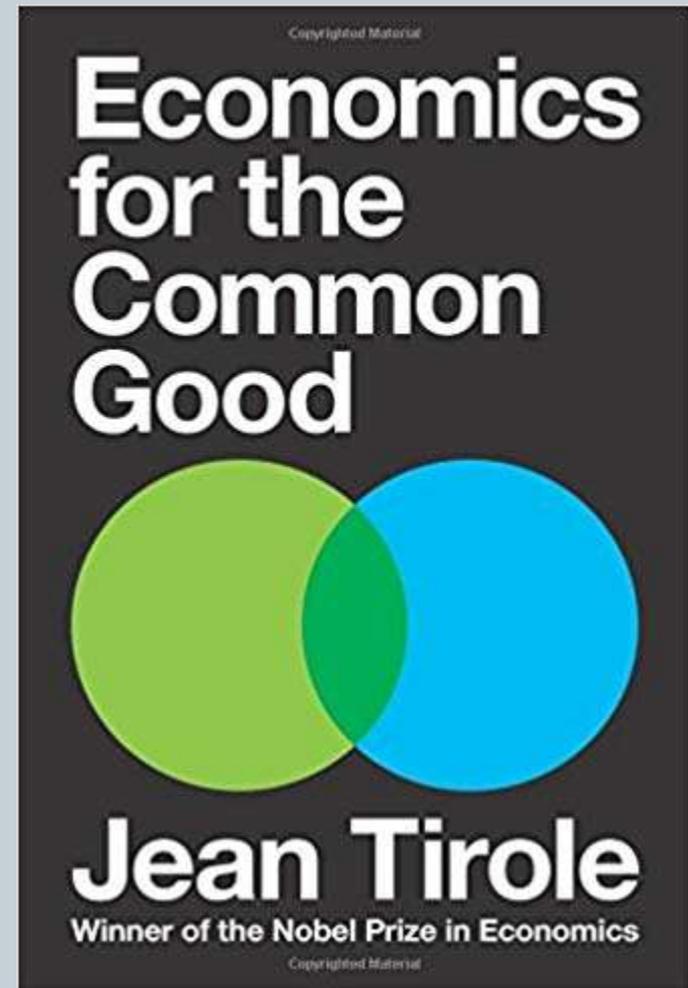DANIEL L. RUBINFELD

SEVENTH EDITION
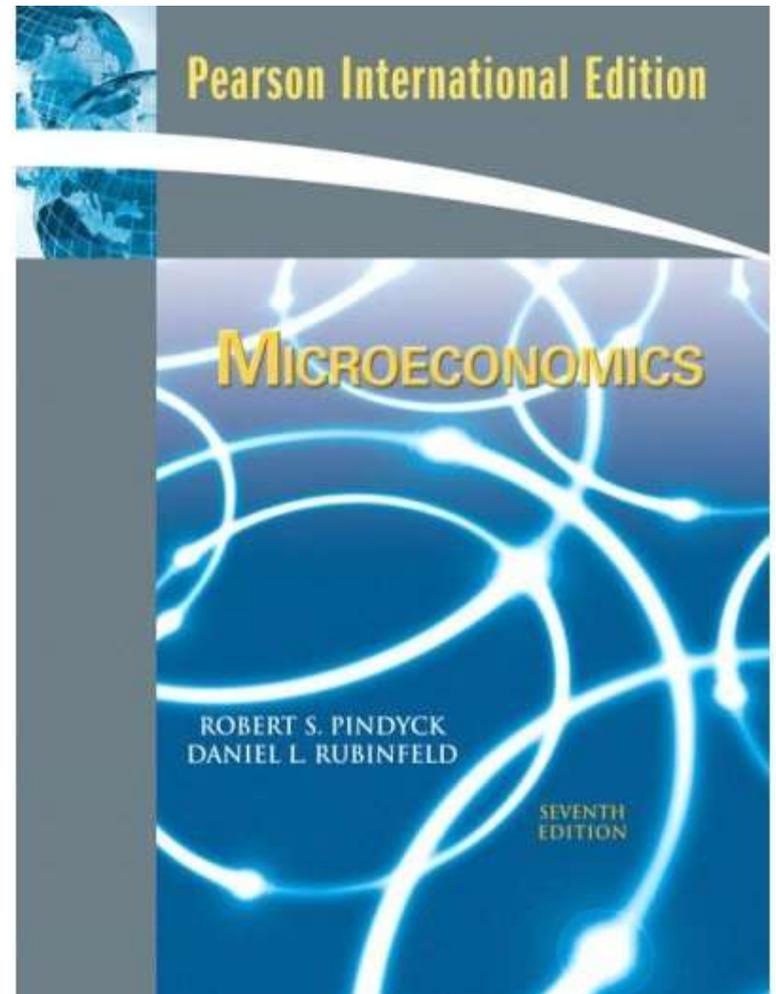
Additional Reading Material

Jean Tirole, **Economics for the Common Good**, Princeton University Press.

Please read these chapters:

- Chapter 13: Competition Policy and Industrial Policy.
- Chapter 16: Innovation and Industrial Policy.
- Chapter 17: Sector Regulation.

Grading system

- Depends on the evolution of the pandemic, the current plan is:

- Mid-term exam: 1/3

- Final exam: 2/3

Course organization

We will have 10 classes of 3 hours each.

Advice:

- Read the recommended sections of the text *before class*. Come to class prepared to ask questions. Print out slides from PDF file (available on webpage) before class.

- During class, take advantage of being in a small group to ask questions. Take notes on the slide printout. Be an active learner.

- After each class, review the exercises solved in class, and solve the other assigned problems.

- Presentation slides and problem sets can be found at:
  - http://andras.niedermayer.ch/teaching

Consumer theory

Revision

Chapter 3. Consumer Behaviour

- **Theory of consumer behaviour:** The description of how each consumer allocates her income among different goods and services to maximize her well-being.

  Consumer behaviour is best understood in three distinct steps:

  1. Consumer preferences (utility function, indifference curves)

  2. Budget constraints

  3. Consumer choices (constrained optimization)

- **Consider a consumer that cares only about two goods**

Food

Clothing
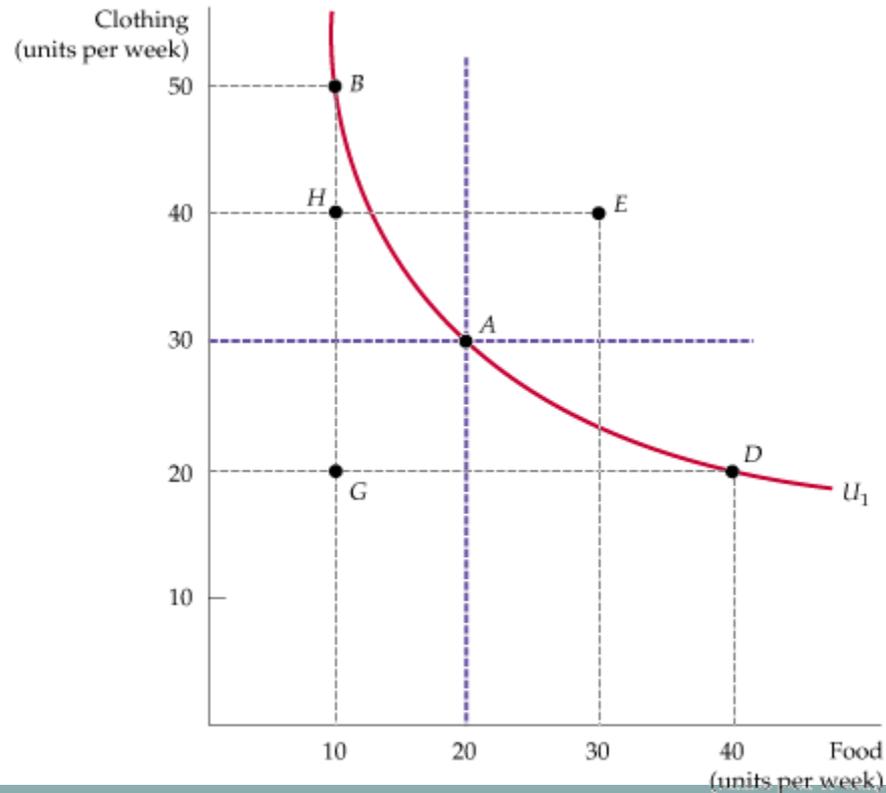
Section 3.1: CONSUMER PREFERENCES

- **Indifference Curves**

  - **Indifference curve:** A curve representing all combinations of market baskets that provide a consumer with the same level of satisfaction.

An Indifference Curve

The indifference curve U_1 that passes through market basket A shows all baskets that give the consumer the same level of satisfaction as does market basket A; these include baskets B and D.

Our consumer prefers basket E, which lies above U_1, to A, but prefers A to H or G, which lie below U_1.
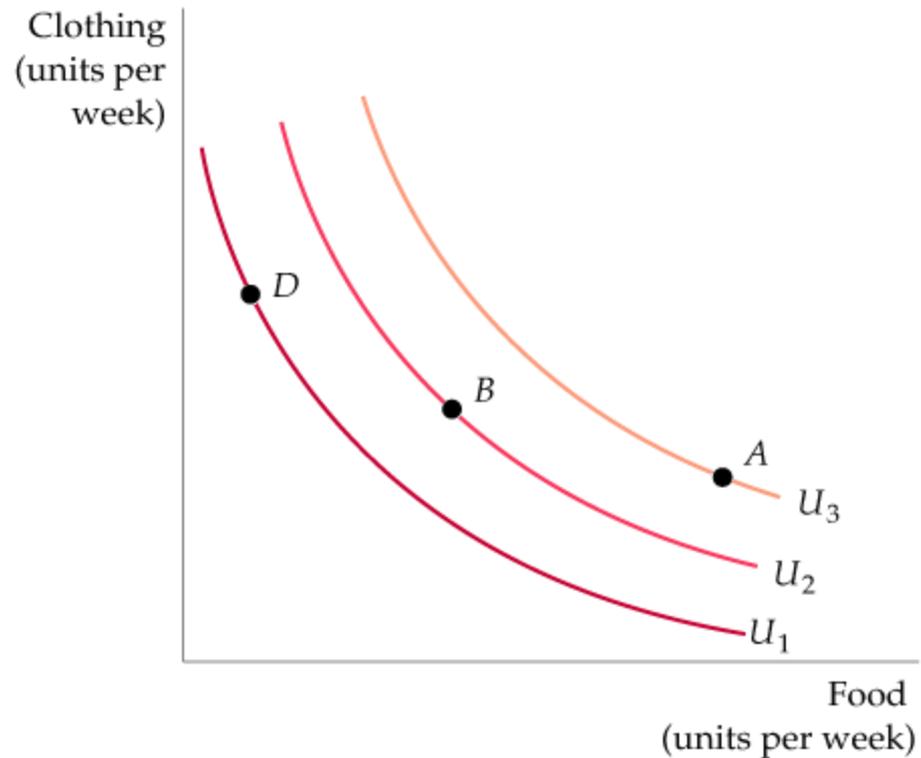
○

- **Indifference Maps**

  - **indifference map:** A graph containing a set of indifference curves showing the market baskets among which a consumer is indifferent.

An Indifference Map

An indifference map is a set of indifference curves that describes a person's preferences.

Any market basket on indifference curve U_3, such as basket A, is preferred to any basket on curve U_2 (e.g., basket B), which in turn is preferred to any basket on U_1, such as D.

Clothing (units per week)

D

B

A

U_3

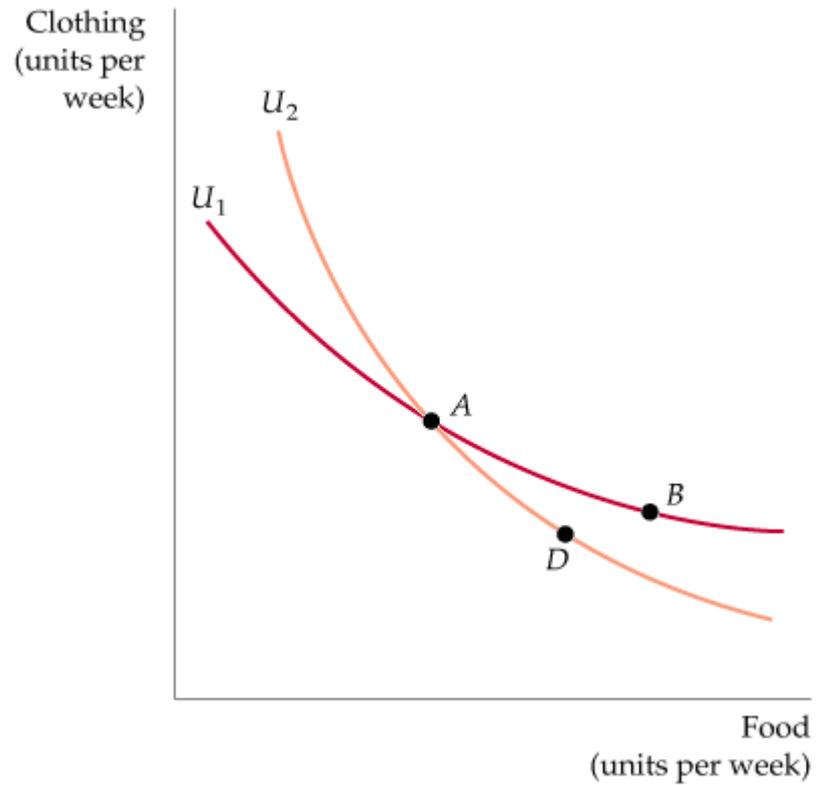U_2

U_1

Food (units per week)

10

● **Indifference Maps**

Indifference Curves Cannot Intersect

If indifference curves U_1 and U_2 intersect, one of the assumptions of consumer theory is violated.

According to this diagram, the consumer should be indifferent among market baskets *A*, *B*, and *D*. Yet *B* should be preferred to *D* because *B* has more of both goods.

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The Marginal Rate of Substitution

- **Marginal rate of substitution (MRS):** The maximum amount of a good that a consumer is willing to give up in order to obtain one additional unit of another good.
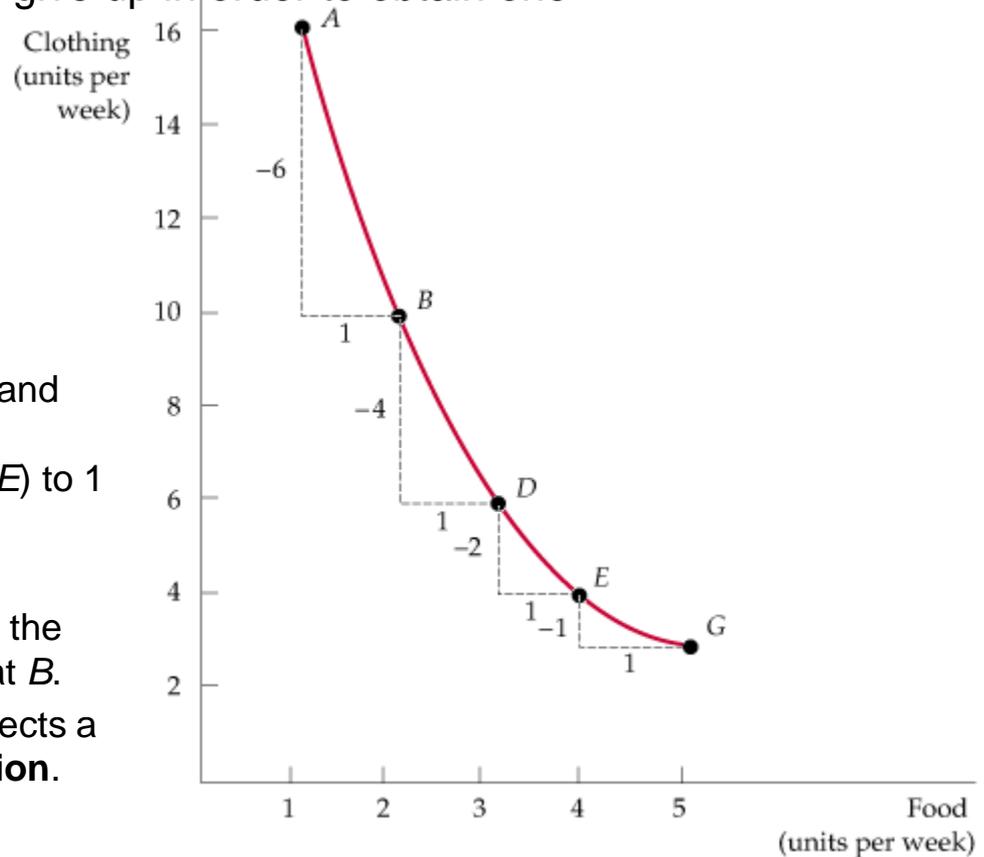
The Marginal Rate of Substitution

The magnitude of the slope of an indifference curve measures the consumer's marginal rate of substitution (MRS) between two goods.

In this figure, the MRS between clothing and food falls from 6 (between *A* and *B*) to 4 (between *B* and *D*) to 2 (between *D* and *E*) to 1 (between *E* and *G*).

Formally, the MRS at a basket (say, *B*) is the *negative slope* of the indifference curve at *B*.
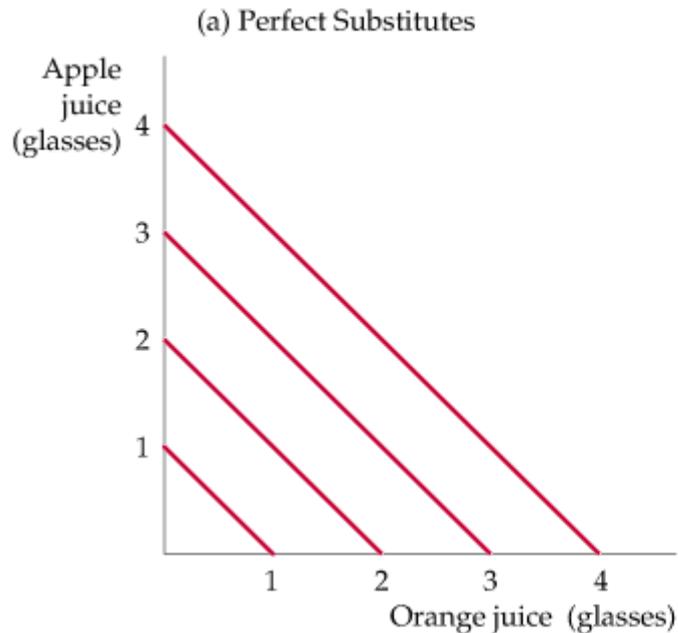
Convexity: The decline in the MRS reflects a **diminishing marginal rate of substitution**. When the MRS diminishes along an indifference curve, the curve is **convex**.
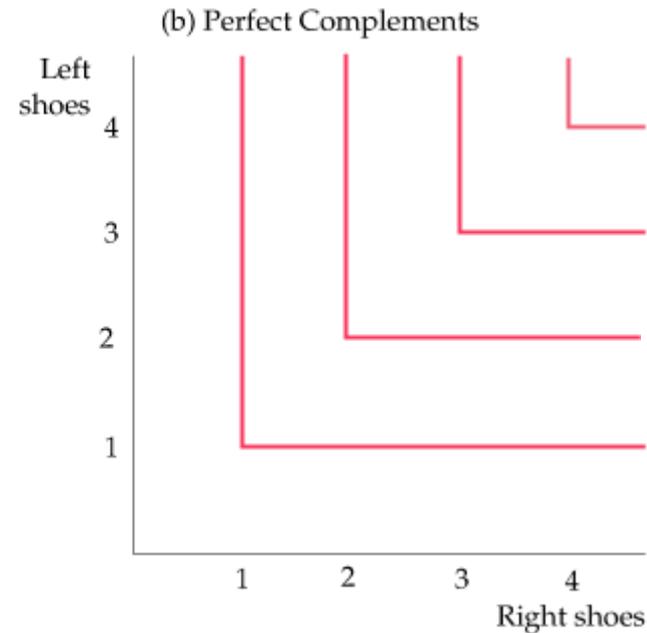
CONSUMER PREFERENCES

- **Perfect substitutes:** Two goods for which the marginal rate of substitution of one for the other is a *constant*. The indifference curves are *straight lines* (parallel to one another)*.*

- **Perfect complements:** Two goods for which the MRS is *zero or infinite*; the indifference curves are *right angles*.

(a) Perfect Substitutes

(b) Perfect Complements

In **(a),** Bob views orange juice and apple juice as **perfect substitutes**: He is always indifferent between a glass of one and a glass of the other.

In **(b)**, Jane views left shoes and right shoes as **perfect complements**: An additional left shoe gives her no extra satisfaction unless she also obtains the matching right shoe.

Bads

- **Bad:** Good for which less is preferred rather than more. (Examples: garbage, dirt, noise, pollution, disease, etc.)

- The negation of a "bad" is a "good" (e.g. sanitation, health)

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● **Utility and Utility Functions**

**Utility Functions and Indifference Curves**

A utility function can be represented by a set of indifference curves, each with a numerical indicator.

This figure shows three indifference curves (with utility levels of 25, 50, and 100, respectively) associated with the utility function *FC*.

Important: Any labelling of the indifference curves in strictly increasing order is a valid utility function.

For example, instead of 25, 50, 100, we could have assigned these three indifference curves the utilities 5, 6, and 13.

● **Utility:** A numerical score representing the satisfaction that a consumer gets from a given market basket.

● **Utility function:** A function that assigns a level of utility to each individual market basket.
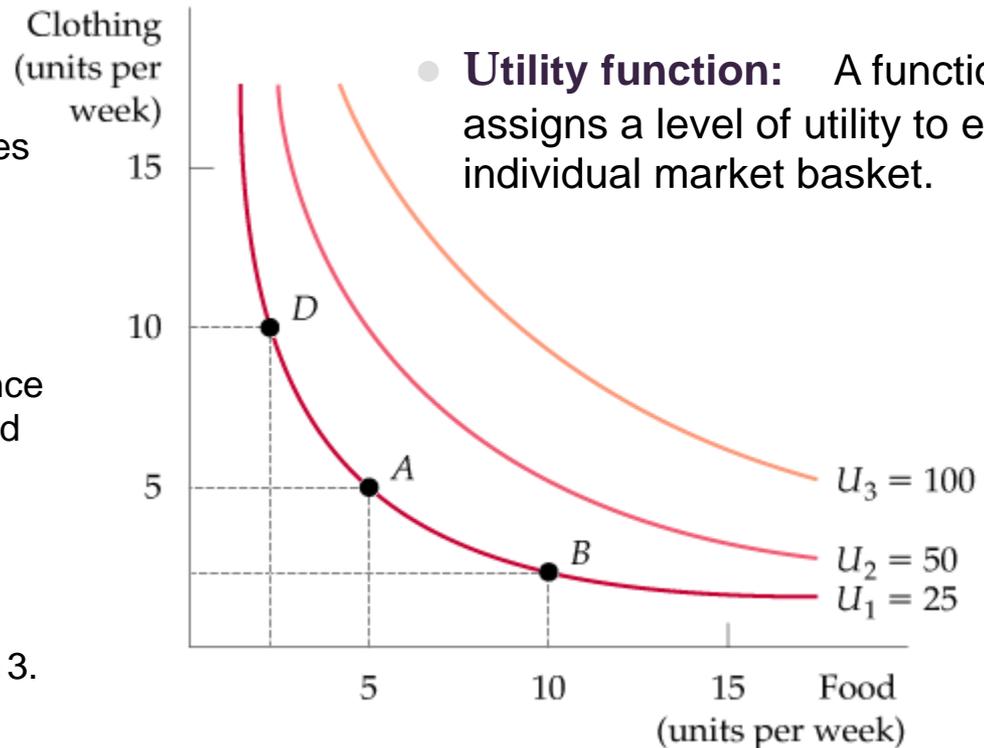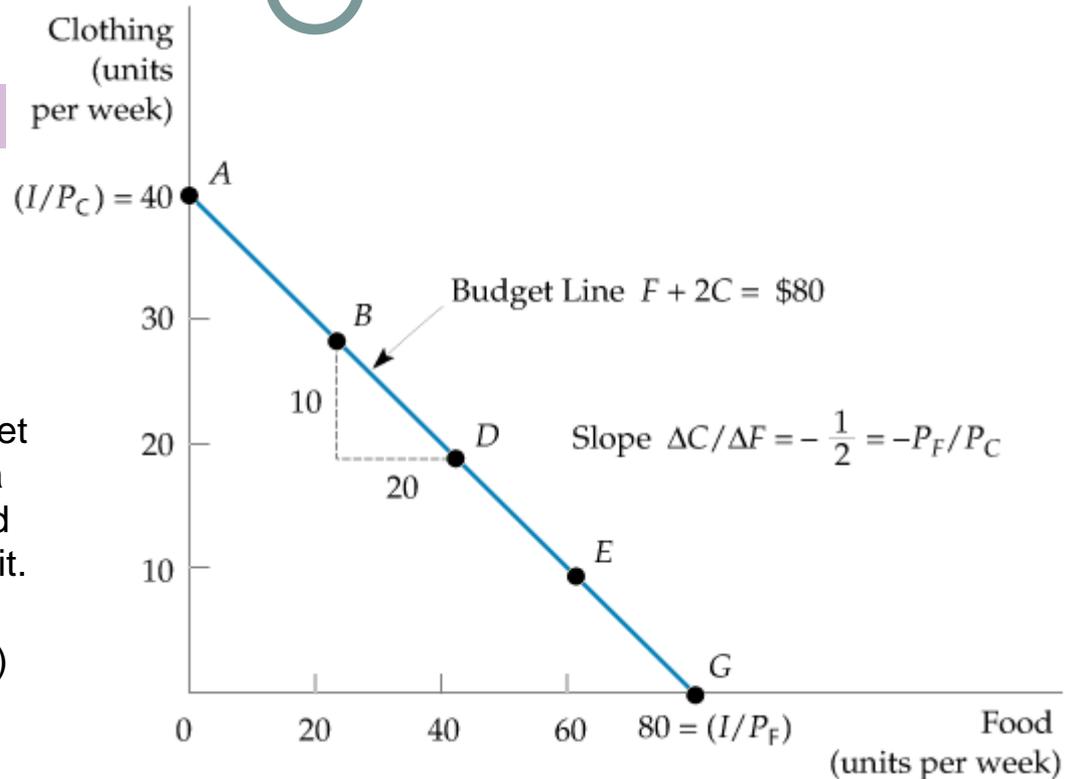
- **The Budget Line**

A Budget Line

A **budget line** describes the combinations of goods that can be purchased given the consumer's income and the prices of the goods.

Line *AG* (which passes through points *B*, *D*, and *E*) shows the budget associated with an income of $80, a price of food of P_F = $1 per unit, and a price of clothing of P_C = $2 per unit.

The **slope** of the budget line (measured between points *B* and *D*) is $-P_F/P_C = -10/20 = -1/2$.

If the prices P_F and P_C are fixed, then clothing-consumption (*C*) can be expressed as a linear function of food-consumption (*F*) and income (*I*) via the following linear equation:

Clothing (units per week)

$(I/P_C) = 40$ — A

30 — B

10

20 — D

20

Budget Line $F + 2C = $80

Slope $\Delta C / \Delta F = -\frac{1}{2} = -P_F/P_C$

E

10

G

0   20   40   60   80 = (I/P_F) Food (units per week)

$$C = (I/P_C) - (P_F/P_C)F$$

BUDGET CONSTRAINTS

○

- **The Effects of Changes in Income and Prices**

Income Changes A change in income (with prices unchanged) causes the budget line to shift *parallel* to the original line (L_1).

When the income of $80 (on L_1) is increased to $160, the budget line shifts *outward* to L_2.

If the income falls to $40, the line shifts *inward* to L_3.
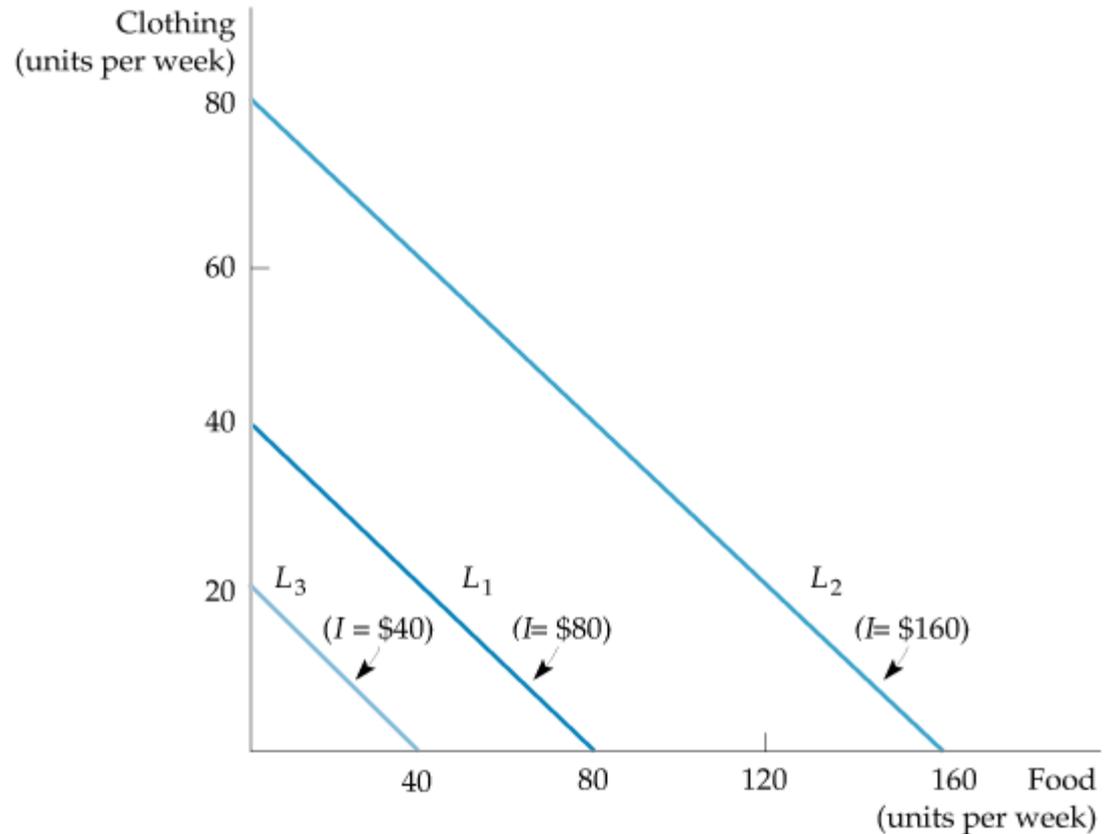
Clothing
(units per week)
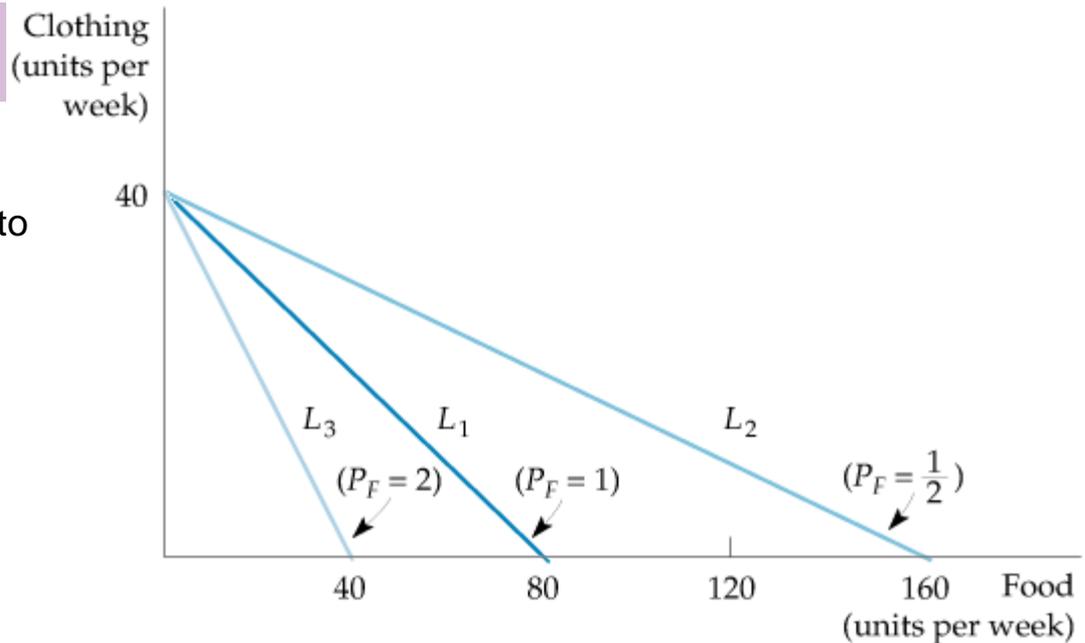
BUDGET CONSTRAINTS

- **The Effects of Changes in Income and Prices**

Effects of a Change in Price on the Budget Line

Price Changes A change in the price of one good (with income unchanged) causes the budget line to *rotate* about one intercept.

When the price of food falls from $1.00 to $0.50, the budget line *rotates outward* from L_1 to L_2.

However, when the price increases from $1.00 to $2.00, the line *rotates inward* from L_1 to L_3.

Clothing (units per week)

40

L_3 L_1 L_2

$(P_F = 2)$ $(P_F = 1)$ $(P_F = \frac{1}{2})$

40 80 120 160 Food (units per week)

The utility maximizing market basket must satisfy two conditions:

1. *It must be located on the budget line.*

2. *It must give the consumer the most preferred combination of goods and services.*

Maximizing Consumer Satisfaction

A consumer maximizes satisfaction by choosing market basket *A*. At this point, the budget line and indifference curve U_2 are **tangent**.

No higher level of satisfaction (e.g., market basket *D*) can be attained.

At *A*, the point of maximization, *the MRS between the two goods equals the price ratio.*

   At *B*, however, because the MRS [− (−10/10) = 1] is greater than the price ratio (1/2), satisfaction is not maximized.
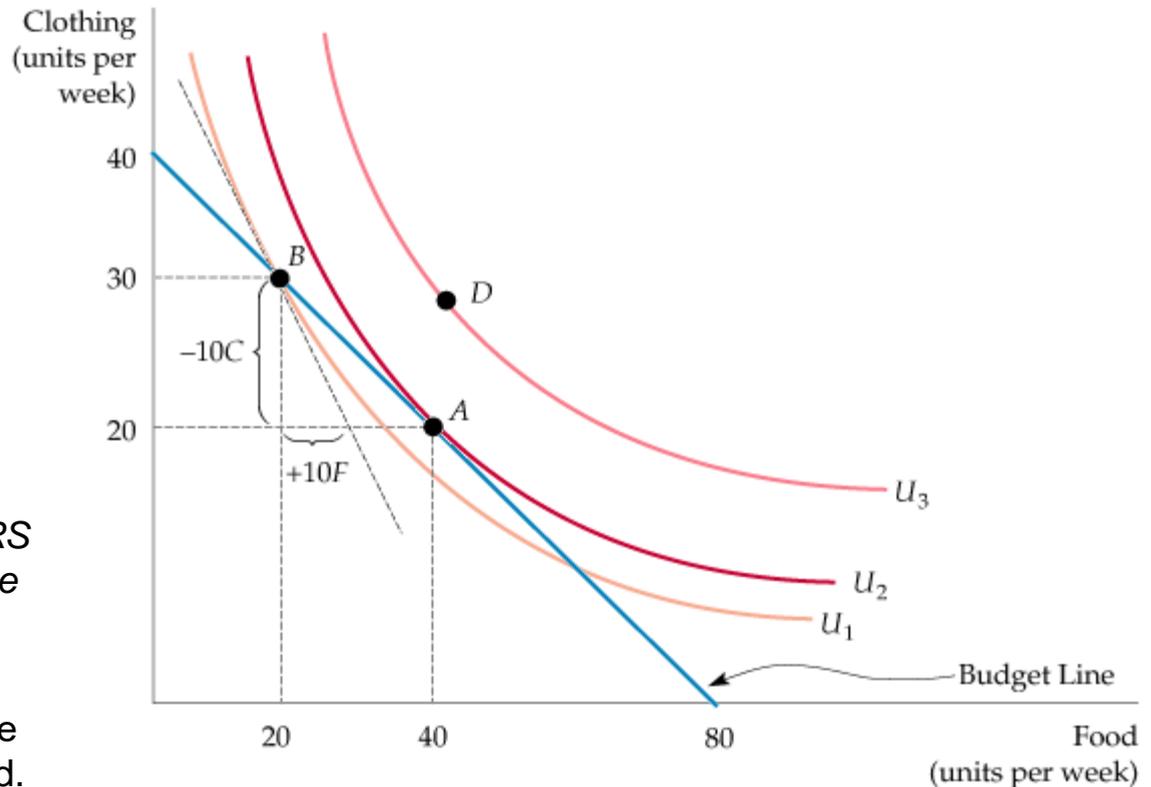
Section 3.4: Marginal utility and consumer choice

Satisfaction is maximized (given the budget constraint) at the point where

$$\text{MRS} = P_F / P_C$$

- Note that $P_F =$ **marginal cost** of food = cost of one additional unit of a good.

- Meanwhile, $P_C =$ **marginal cost** of clothing.
- Also, note that $\text{MRS} = MU_F / MU_C$, where

  $MU_F =$ **marginal utility** of food = Benefit from the consumption of one additional unit of a good, and

  $MU_C =$ **marginal utility** of clothing.

Combining these equations, we get: $MU_F / MU_C = P_F / P_C$.

This is the kind of optimization condition that arises often in economics. In this instance, satisfaction is maximized when the **ratio of marginal benefits** equals the **ratio of marginal costs.**

(**Note**: The book screws up the explanation by assuming $P_C = MU_C = 1$.)

CONSUMER CHOICE

● **Corner Solutions**

● **Corner solution:** A situation in which the marginal rate of substitution of one good for another in a chosen market basket is not equal to the slope of the budget line.

A Corner Solution

When the consumer's marginal rate of substitution is not equal to the price ratio for all levels of consumption, a corner solution arises. The consumer maximizes satisfaction by consuming only one of the two goods.

Given budget line *AB*, the highest level of satisfaction is achieved at *B* on indifference curve U_1, where the MRS (of ice cream for frozen yogurt) is greater than the ratio of the price of ice cream to the price of frozen yogurt.

Note: In a corner solution we do *not* usually satisfy the equation

$$MRS = P_F / P_C$$
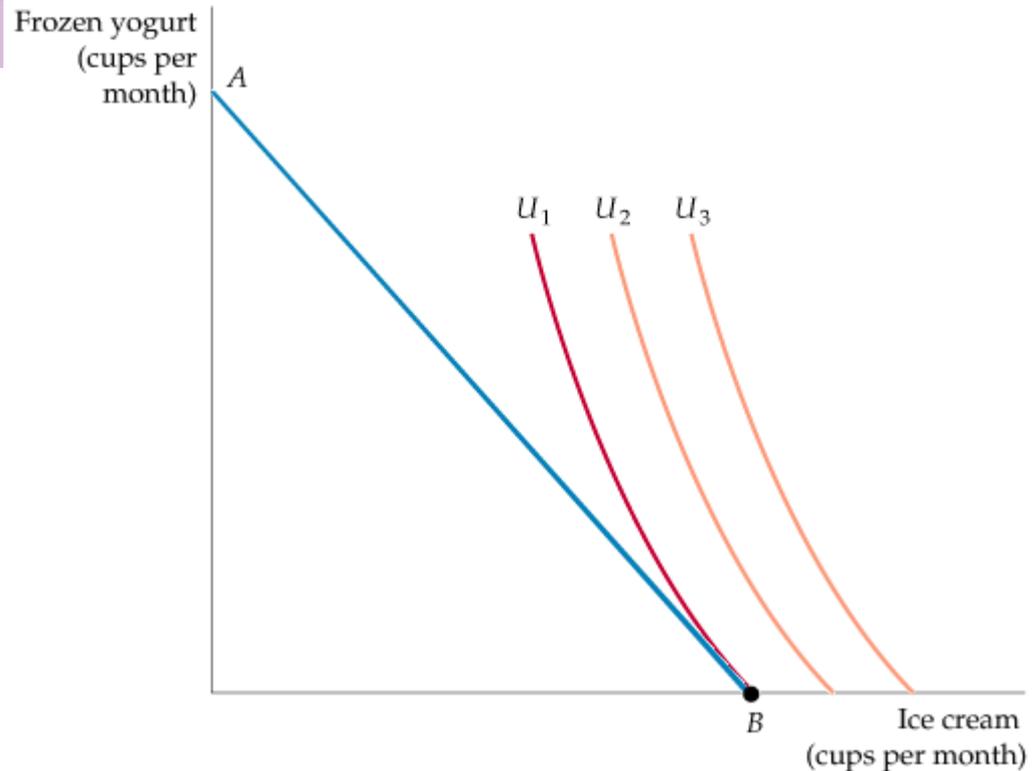
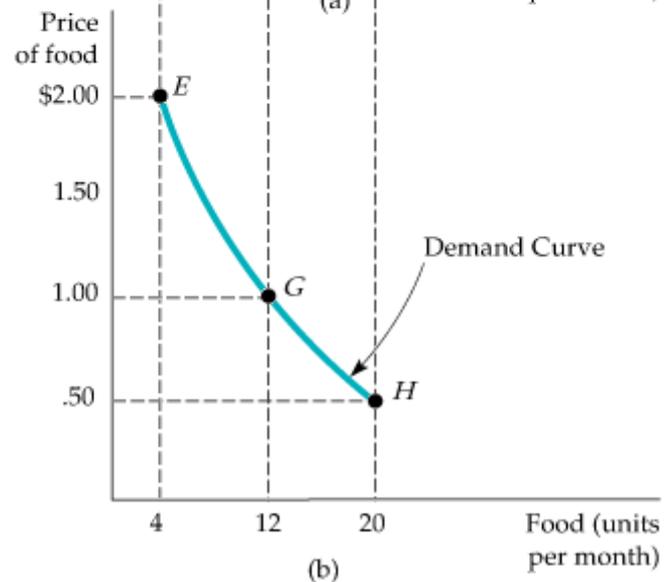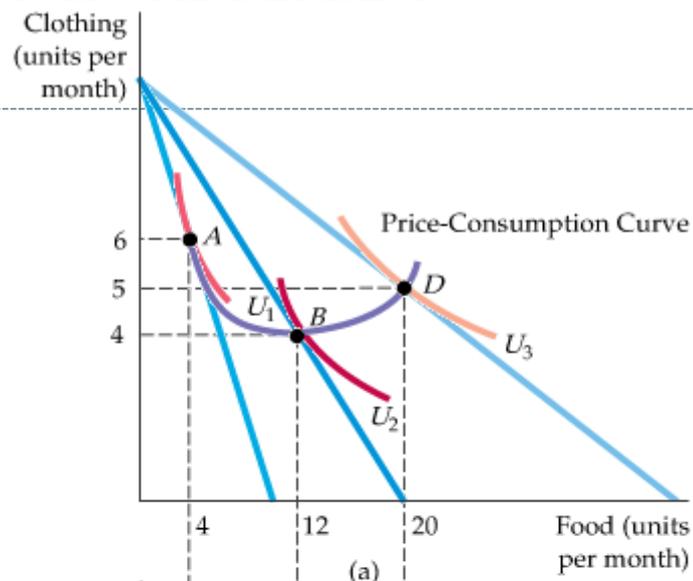# Chapter 4: Individual and Market Demand

Price Changes

Effect of Price Changes

A reduction in the price of food, with income and the price of clothing fixed, causes this consumer to choose a different market basket.

In **(a)**, the baskets that maximize utility for various prices of food (point *A*, $2; *B*, $1; *D*, $0.50) trace out the **price-consumption** curve.

Part **(b)** gives the **demand curve**, which relates the price of food to the quantity demanded. (Points E, G, and H correspond to points A, B, and D, respectively).

Clothing (units per month)

Price-Consumption Curve

Food (units per month)

(a)

Price of food

Demand Curve

Food (units per month)

(b)

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Section 4.3: MARKET DEMAND

From Individual to Market Demand

Summing to Obtain a Market Demand Curve

The market demand curve is obtained by summing our three consumers' demand curves D_A, D_B, and D_C.

At each price, the quantity of coffee demanded by the market is the sum of the quantities demanded by each consumer.

At a price of $4, for example, the quantity demanded by the market (11 units) is the sum of the quantity demanded by A (no units), B (4 units), and C (7 units).

From Individual to Market Demand

Two points should be noted as a result of this analysis:

1. *The market demand curve will shift to the right as more consumers enter the market.*

2. *Factors that influence the demands of many consumers will also affect market demand.*

The aggregation of individual demands into market demands becomes important in practice when market demands are built up from the demands of different demographic groups or from consumers located in different areas.

For example, we might obtain information about the demand for home computers by adding independently obtained information about the demands of the following groups:

- Households with children
- Households without children
- Single individuals

MARKET DEMAND

Elasticity of Demand

Denoting the quantity of a good by Q and its price by P, the ***price elasticity of demand*** is

$$E_p = \frac{\Delta Q / Q}{\Delta P / P} = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right) = \frac{\text{\% increase in demand}}{\text{\% increase in price}}$$

Inelastic Demand

When demand is **inelastic** (i.e. E_p is less than one in absolute value), the quantity demanded is relatively *unresponsive* to changes in price. As a result, total expenditure on the product *increases* when the price increases. (Examples: necessities such as food, water, petrol.)

Elastic Demand

When demand is **elastic** (E_p is greater than one in absolute value), total expenditure on the product *decreases* as the price goes up.
(Examples: luxury items.)

Welfare economics: Main concepts

- *Consumer surplus* (Section 4.4)

Section 4.4: Consumer surplus

Consider a consumer who purchases a quantity Q of some good at some price P in the market. The **consumer surplus** for this person is the amount she benefits from being able to purchase the quantity Q at the price P.

Consumer surplus: The case of indivisible goods (computation)

Maximum price the consumer would be willing to pay:

- For the 1st unit: 100 euros
- For the 2nd unit: 85 euros
- For the 3rd unit: 50 euros
- For the 4th unit: 30 euros
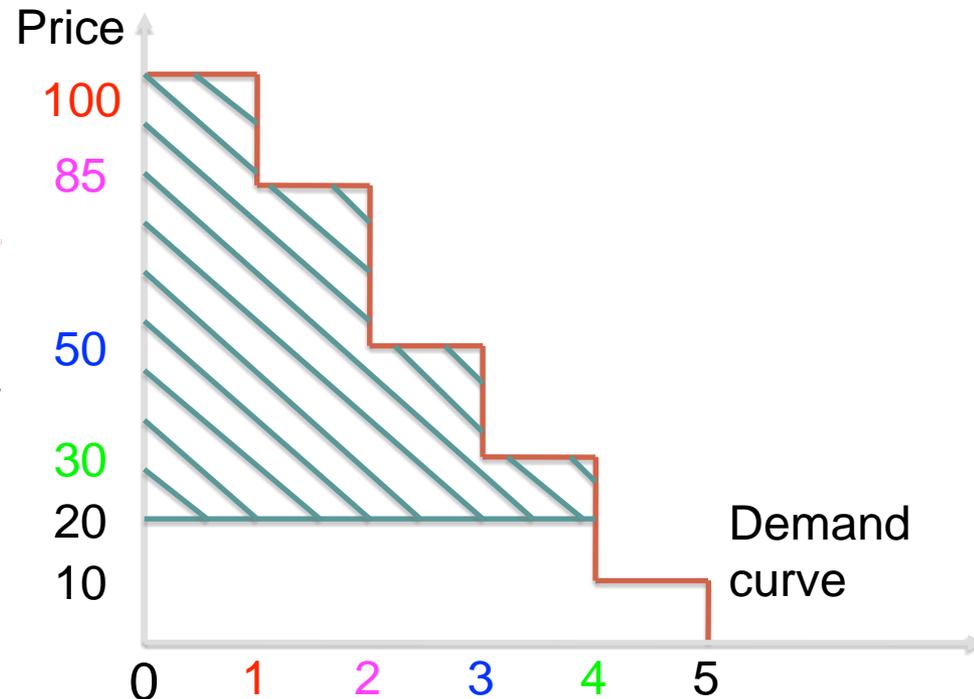
☐ If price = 20 euros, the consumer will buy 4 units.

☐ "Total monetary value" for consuming 4 units :

☐ 100+85+50+30=265

☐ Monetary *cost* for the 4 units bought :

☐ 20 x 4 =80

☐ **Surplus** = 265-80=185

Caveat

- It is important to distinguish the ***price paid*** for a good by a consumer and the ***monetary value*** of this good for this consumer.

- Monetary value = ***maximum price*** the consumer would be willing to pay for this good.

- Thus, the price paid is the lower bound for the monetary value.

Consumer surplus:
The case of divisible goods (pictorial)

Price

Surplus

Amount paid by the consumer

Demand curve

C

P

B

O

A

Quantity
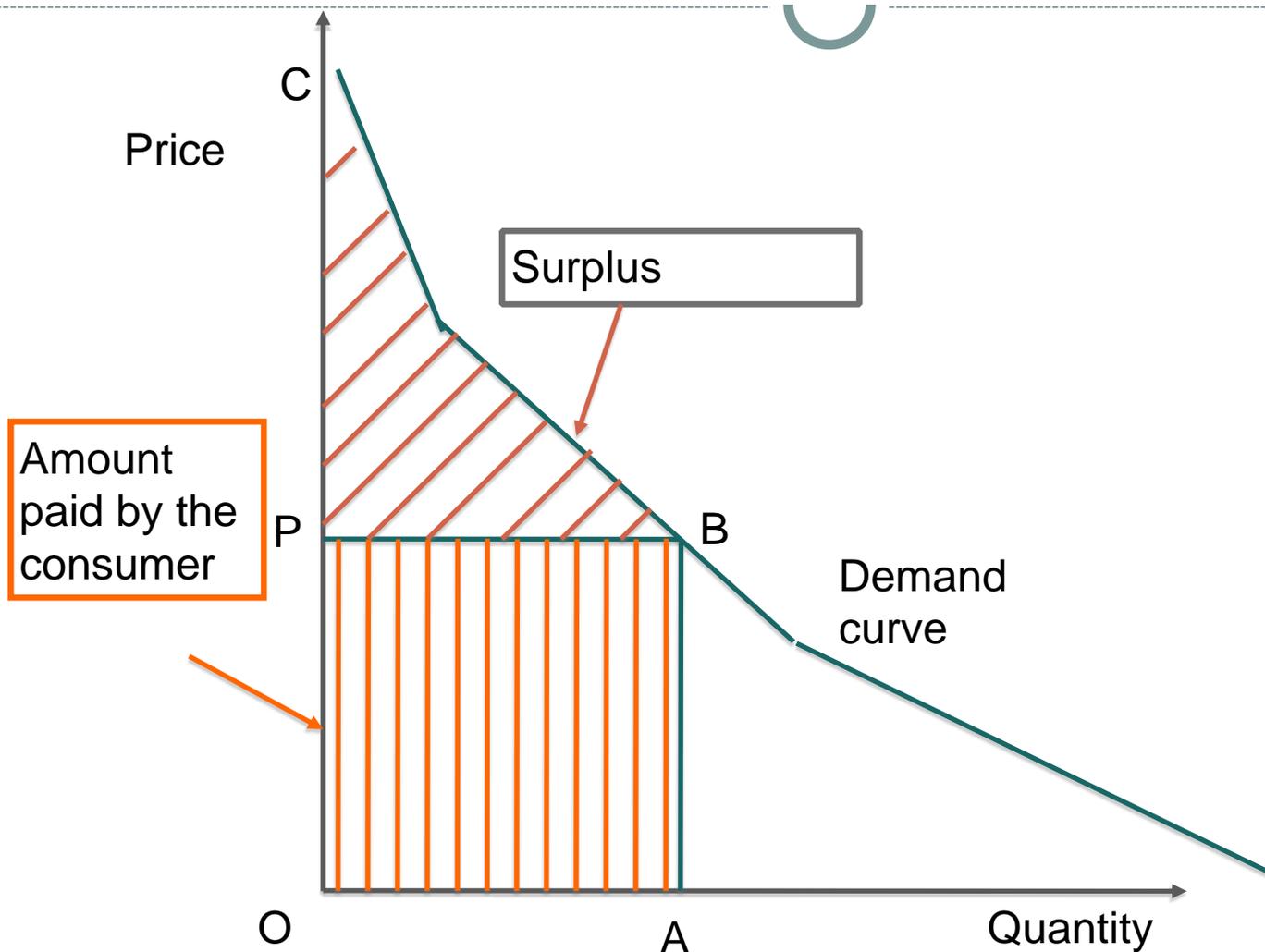
Consumer surplus: computation (not in book)

- Assume quasi-linear utility $U(x,y)=x+u(y)$ and income R.

- A utility maximizer would spend all money, so that the utility is $R-py+u(y)$

- The surplus is $S=u(y)-u(0)-py$.

Consumer surplus: computation (not in book)

○ By definition, we have that:

$$\int_0^y u'(t)\,dt = u(y) - u(0)$$

○ hence:

$$S = \int_0^y p(t)\,dt - py$$

○ Given that *u'(y)=p(y), where u'(y) is the marginal utility and p(y) is the inverse demand function. (This comes from utility maximization.)*

→**surplus**

= area of trianguloid region *BCP*

Aggregate consumers' surplus

- Assume all consumers have quasilinear preferences.
- *Consumers' surplus = sum of the individual surpluses*
- Graphically, area of trianguloid BCP (defined by the *aggregate* demand curve).
- **Important Remark:** we can "add" individual utilities because of our strong assumption on preferences (i.e. quasilinearity w.r.t. income) means that there is *a common unit to measure utility* for all the consumers (the Euro).
- This implies that *utility transfers are possible though money transfers.* (In real life, this is false).

Summary of Chapters 3 and 4

- Consumers *maximize utility* subject to a *budget constraint*.

- At the optimal consumption bundle, the *marginal rate of substitution* between two goods (the ratio of their *marginal utilities*) equals their *price ratio*. (i.e. the indifference curve is *tangent* to the budget line).

- Using this fact, we can derive each consumer's demand as a function of price (her *demand curve*) and her demand as a function of her income (her *Engel curve*).

- The demand response to a price decrease is a sum of a *substitution effect* (positive) and an *income effect* (possibly negative, if it is an *inferior good*). Usually, the net effect is *positive*, so demand *increases* as price decreases. (Exception: *Giffen goods*).

- The notion of *consumer surplus* depends on the hypothesis that the marginal utility of income is constant.

- *Aggregate consumer surplus* is the sum of individual surpluses.

- An allocation is *Pareto efficient* if there is 'no waste'.

- Aggregate surplus is maximized in a Pareto efficient allocation.

We did *not* cover sections 3.4, 3.6, 4.5, and 4.6.

Chapter 3 Exercise 5

- Suppose that Bridget and Erin spend their incomes on two goods, food (F) and clothing (C). Bridget's preferences are represented by the utility function $U(F,C) = 10FC$, while Erin's preferences are represented by the utility function
  $U(F,C) = 0.20\, F^2 C^2$.

- **a.** With food on the horizontal axis and clothing on the vertical axis, identify on a graph the set of points that give Bridget the same level of utility as the bundle (10, 5). Do the same for Erin on a separate graph.

- **b.** On the same two graphs, identify the set of bundles that give Bridget and Erin the same level of utility as the bundle (15, 8).

- **c.** Do you think Bridget and Erin have the same preferences or different preferences? Explain.

Chapter 3 Exercise 10

- Antonio buys five new college textbooks during his first year at school at a cost of $80 each. Used books cost only $50 each. When the bookstore announces that there will be a 10 percent increase in the price of new books and a 5 percent increase in the price of used books, Antonio's father offers him $40 extra.

- **a.** What happens to Antonio's budget line? Illustrate the change with new books on the vertical axis.

- **b.** Is Antonio worse or better off after the price change? Explain.

Chapter 3 Exercise 16

- Julio receives utility from consuming food (F) and clothing (C) as given by the utility function $U(F,C)=FC$. In addition, the price of food is $2 per unit, the price of clothing is $10 per unit, and Julio's weekly income is $50.

- **a.** What is Julio's marginal rate of substitution of food for clothing when utility is maximized? Explain.

- **b.** Suppose instead that Julio is consuming a bundle with more food and less clothing than his utility maximizing bundle. Would his marginal rate of substitution of food for clothing be greater than or less than your answer in part a? Explain.