

ECONOMICS 100A: MICROECONOMICS

Fall 2001

Tu, Th 9:35-10:55am

CH 101

Wed 5:40-6:50pm

SLH 107

Prof: Mark Machina

Office: Econ. Bldg. 217

Hours: T,Th 8-9:15, 3:45-4:30

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Tues 1-3pm

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Mon, Wed 3-4pm

DATE	TOPIC	TEXTBOOK / MATH HANDOUT
Sep. 20	Introduction & Mathematical Review #1	Chs. 1,2 / Sect. A,B,C
Sep. 25	Consumer Preferences: Utility Functions and Indifference Curves	3
Sep. 27	Mathematical Review #2	D, E
Oct. 2	Utility Maximization and Demand Functions I	4
Oct. 4	Utility Maximization and Demand Functions II	4
Oct. 9	Comparative Statics of Demand I	4
Oct. 11	Comparative Statics of Demand II	4
Oct. 16 (Tuesday)	1st Midterm Exam	Mandeville Auditorium 9:35-10:55am
Oct. 18	Supply of Factors of Production I	pp. 511-514
Oct. 23	Supply of Factors of Production II	15.1-4, 15.6
Oct. 25	Theory of Production	6
Oct. 30	Theory of Cost I	7
Nov. 1	Theory of Cost II	7
Nov. 6	Mathematical Review #3	F
Nov. 8	Profit Maximization and Supply Under Perfect Competition I	8
Nov. 13	Profit Maximization and Supply Under Perfect Competition II	8
Nov. 15 (Thursday)	2nd Midterm Exam	Mandeville Auditorium 9:35-10:55am
Nov. 20	Equilibrium and Dynamics of Perfectly Competitive Markets I	9
Nov. 27	Equilibrium and Dynamics of Perfectly Competitive Markets II	9
Nov. 29	Demand for Factors of Production	14.1-2, 15.8
Dec. 7 (Friday)	FINAL EXAM (location to be announced)	8:00am - 11:00am

TEXT & READINGS: *Microeconomics*, 5th ed., Robert Pindyck & Daniel Rubinfeld, Prentice Hall, 2001. You are responsible for all the material in the assigned chapters. There is also a Soft Reserve package, with a Mathematical Handout that contains required material for the course.

EXAMS: Grades are determined on the basis of two Midterm Exams and the Final Exam.

PRACTICE PROBLEMS: A large set of old exam problems is included in the Soft Reserve package. You are urged to practice on them, in preparation for the actual exams.

Web Page (including e-mail links): <http://weber.ucsd.edu/~mmachina/courses/100A/100A.html>

ECON 100A COURSE OUTLINE – Fall 2001

I. INTRODUCTION

- a. **Domain of Microeconomic Analysis**
- b. **Circular Flow Diagram**
- c. **Stocks vs. Flows and the Dimensions of Economic Variables**

II. MATHEMATICAL REVIEW #1

- a. **Calculus Review** (Math Handout, Section A)
 - Derivatives, Partial Derivatives and the Chain Rule
 - Approximation Formulas for Small Changes in Functions (Total Differentials)
- b. **Elasticity** (Math Handout, Section B)
 - Absolute, Proportionate and Percentage Changes in Variables
 - Definition of Elasticity and Examples
 - Constant Elasticity Functions
- c. **Level Curves of Functions** (Math Handout, Section C)
 - Definition and Graphical Illustration
 - Algebraic Formula for a Level Curve
 - Formula for the Slope of a Level Curve

III. CONSUMER PREFERENCES: UTILITY FUNCTIONS & INDIFFERENCE CURVES

- a. **Commodities and Commodity Bundles**
 - Commodities are Typically *Flows*, not *Stocks*
 - Issue of Divisibility
- b. **Utility Functions**
 - Preferences are Defined over Commodity Bundles, *not* Individual Commodities
 - Utility Functions and Total Utility Curves
 - Important Examples: Linear, Cobb-Douglas, Leontief
 - Marginal Utility and Marginal Utility Curves
 - Hypothesis of Diminishing Marginal Utility
- c. **Indifference Curves and the Marginal Rate of Substitution**
 - Deriving a Consumer's Indifference Curves from Their Utility Function
 - General Properties of Indifference Curves:
 - One Through Every Commodity Bundle
 - Downward Sloping and Can't Cross
 - Marginal Rate of Substitution (MRS)
 - Graphical Interpretation: Slope of the Indifference Curve
 - Algebraic Formula: Ratio of Marginal Utilities
 - Hypothesis of Diminishing Marginal Rate of Substitution

IV. MATHEMATICAL REVIEW #2

- a. **Solving Optimization Problems** (Math Handout, Section D)
 - General Structure of Optimization Problems
 - First and Second Order Conditions for Unconstrained Optimization Problems
 - First Order Conditions for Constrained Optimization Problems
- b. **Scale Properties of Functions** (Math Handout, Section E)

V. UTILITY MAXIMIZATION AND DEMAND FUNCTIONS

a. Utility Maximization Subject to a Budget Constraint

Graphical Illustration

First Order Conditions for Utility Maximization

Two Interpretations of the First Order Conditions

Second Order Conditions (Hypothesis of Diminishing MRS)

Algebraic Examples: Cobb-Douglas, Leontief, Linear

Corner Solutions: Graphical Illustration and Algebraic Condition

b. Regular ("Marshallian") Demand Curves and Demand Functions

Definition of Regular Demand Functions

Examples: Cobb-Douglas, Leontief, Linear

General Properties of Demand Functions:

Walras' Law

Scale Invariant in Prices and Income

Relationship between Price Elasticities & Income Elasticity for a Good

Market Demand Functions

VI. COMPARATIVE STATICS OF DEMAND

a. Income Changes

Income-Consumption Locus

Engel Curves: Definition and Graphical Derivation

Income Elasticity

Superior, Normal and Inferior Goods

Income Elasticity and Budget Shares

Relationship Between Income Elasticities of All Goods

Algebraic Derivation of the Effect of an Income Change

b. Price Changes

Price-Consumption Locus

Graphical Derivation of Marshallian Demand Curves

Own Price Elasticity

Price Elasticity and Expenditures

Cross Price Elasticity

Gross Substitutes and Gross Complements

Algebraic Derivation of the Effect of a Price Change

c. Compensated Price Changes and Compensated ("Hicksian") Demand Functions

Graphical Illustration of a Compensated Price Change

Graphical Derivation of Compensated Demand Curves

Algebraic Derivation of Compensated Demand Functions

Examples: Cobb-Douglas, Leontief

Algebraic Derivation of the Effect of a Compensated Price Change

d. Slutsky Equation

Expressing Each of the Three Basic Changes in Terms of the Other Two

Graphical Illustration

Algebraic Formulation and Informal Proof

Giffen Goods

VII. SUPPLY OF FACTORS OF PRODUCTION

a. Supply of Labor: The Labor-Leisure Decision

Income-Leisure Space and the Labor-Leisure Decision
First Order Conditions for Optimal Supply of Labor
Comparative Statics: Income and Substitution Effects
Backward Bending Supply of Labor Curves
Kinked Budget Lines and the Overtime Decision

b. Supply of Capital: The Consumption-Savings Decision

Intertemporal Income and Consumption Streams
Interest Rates and Discounted Present Value of a Stream
Intertemporal Utility Maximization
First Order Conditions and Interpretation
Comparative Statics: Income and Substitution Effects

VIII. THEORY OF PRODUCTION

a. Production Functions

Types of Factors and Their Income
Important Examples: Linear, Leontief, Cobb-Douglas
Total Product Curves

b. Marginal Products and the Law of (Eventually) Diminishing Marginal Product

Definition of Marginal Product
Marginal Product Curves
Examples: Linear, Leontief, Cobb-Douglas
Hypothesis of Diminishing Marginal Product of a Factor

c. Average Products and the Average-Marginal Relationship

Definition of Average Product
Average Product Curves
Examples: Linear, Leontief, Cobb-Douglas
Average-Marginal Relationship ("Grade Point Average Theorem")
Proof of the Average-Marginal Relationship

d. Isoquants and the Marginal Rate of Technical Substitution (MRTS)

Definition and General Properties of Isoquants
Examples: Linear, Cobb-Douglas, Leontief
Definition of the Marginal Rate of Technical Substitution
Expressing the MRTS in Terms of Marginal Products
Examples: Linear, Leontief, Cobb-Douglas
Hypothesis of Diminishing MRTS

e. Returns to Scale

IX. THEORY OF COST

a. Nature of Cost

Definition of Cost
Accounting Cost vs. Opportunity Cost of Owned Factors
Numerical Example
Cost of Entrepreneurial Ability and Definition of "Economic Profits"
Short Run Planning versus Long Run Planning

b. Short Run Cost Functions

Expansion Path in the Short Run

Graphical Derivation of the Short Run Total Cost Curve

Algebraic Derivation of Short Run Total Cost Function (STC)

Examples: Linear, Leontief, Cobb-Douglas

Short Run Variable Cost Function (SVC)

Short Run Fixed Cost Function (SFC)

Short Run Marginal Cost Function (SMC)

Relation of SMC to Marginal Product of Labor and Wage Rate

Short Run Average Total Cost Function (SATC)

Short Run Average Variable Cost Function (SAVC)

Short Run Average Fixed Cost Function (SAFC)

Average-Marginal Relationships

c. Long Run Cost Minimization

Isocost Lines

Graphical Illustration of Long Run Cost Minimization

First Order Conditions for Long Run Cost Minimization

Two Interpretations of the First Order Conditions

Second Order Conditions (Hypothesis of Diminishing MRTS)

Output-Constrained Factor Demands

d. Long Run Cost Functions

Expansion Path in the Long Run

Graphical Derivation of the Long Run Total Cost Curve

Algebraic Derivation of Long Run Total Cost Function (LTC)

Properties of Long Run Total Cost Functions:

Increasing in Output

Nondecreasing in Factor Prices

Constant Returns to Scale in Factor Prices

Examples: Linear, Leontief, Cobb-Douglas

Long Run Marginal Cost Function (LMC)

Relation of LMC to all Marginal Products and Factor Prices

Long Run Average Cost Function (LAC)

Average-Marginal Relationship

Returns to Scale and Long Run Average Cost

e. Relationship Between Long Run and Short Run Cost Curves

Long and Short Run Total Cost Curves

Long and Short Run Average Cost Curves

Long and Short Run Marginal Cost Curves

X. MATHEMATICAL REVIEW #3

a. Comparative Statics of Solution Functions (Math Handout, Section F)

b. Comparative Statics of Equilibria (Math Handout, Section F)

c. Comparative Statics of Optimal Value Functions (Math Handout, Section G)

XI. PROFIT MAXIMIZATION AND SUPPLY UNDER PERFECT COMPETITION

a. Long Run Profit Maximization and Long Run Supply

Long Run Profit Maximization (Graphical Illustration and Algebraic Formulation)

First Order Conditions and Interpretation

Second Order Condition (Increasing Marginal Cost)

Graphical Derivation of the Long Run Supply Curve

Algebraic Formulation of Long Run Supply Function

Examples: Cobb-Douglas, Cubic LTC, Constant Returns to Scale

Properties of Long Run Supply Functions:

Increasing in Output Price

Nonincreasing in Factor Prices

Scale Invariant in Output Price and Factor Prices

Long Run Elasticity of Supply

b. Short Run Profit Maximization and Short Run Supply

Short Run Profit Maximization and the Shut Down Decision

Illustration in Terms of STC and SVC Curves

Illustration in Terms of SATC and SAVC Curves

Short Run Supply Curve of the Firm

Short Run Supply Function of the Firm

Example: Cubic STC, Cobb-Douglas Example

Properties of Short Run Supply Functions:

Increasing in Output Price

Nonincreasing in Factor Prices

Scale Invariant in Output Price and Factor Prices

Short Run Market Supply

XII. EQUILIBRIUM, DYNAMICS AND COMPARATIVE STATICS OF PERFECTLY COMPETITIVE MARKETS

a. Assumptions of Perfect Competition and the "Law of One Price"

Large Number of Buyers and Sellers

Homogeneous Commodity

Perfect Information

Free Entry and Exit in the Long Run

Law of One Price

b. Equilibrium in Perfectly Competitive Markets

Market Equilibrium in the Very Short Run

Market Equilibrium in the Short Run

Market Equilibrium in the Long Run

Long Run Supply Curve of the Market

Properties of Long Run Competitive Equilibrium

c. Dynamics of Market Adjustment

d. Comparative Statics of Perfectly Competitive Markets

Shifts in Supply and Demand Functions

What Determines How Much Price vs. Quantity Adjusts?

Taxes and Subsidies

Who Bears the Burden of a Tax?

Price Floors and Price Ceilings

XIII. DEMAND FOR FACTORS OF PRODUCTION

a. Maximizing Profits by Choosing Optimal Input Levels

Marginal Value Product of a Factor of Production

b. Short Run Factor Demand

First Order Condition for Short Run Profit Maximization

Short Run Factor Demand Functions

Nonincreasing in Own Factor Price

Scale Invariant in Output Price and Factor Prices

Relation to Short Run Supply Function

c. Long Run Factor Demand

First Order Conditions for Long Run Profit Maximization

Long Run Factor Demand Functions

Nonincreasing in Own Factor Price

Scale Invariant in Output Price and Factor Prices

Relation to Long Run Supply Function

ECON 100A FAMOUS OPTIMIZATION PROBLEMS

Optimization Problem	Objective Function	Constraint	Control Variables	Parameters	Solution Functions	Optimal Value Function
Consumer's Problem	$U(x_1, \dots, x_n)$ utility function	$p_1 \cdot x_1 + \dots + p_n \cdot x_n = I$ budget constraint	x_1, \dots, x_n commodity levels	p_1, \dots, p_n, I prices and income	$x_i(p_1, \dots, p_n, I)$ regular demand functions	$V(p_1, \dots, p_n, I)$ indirect utility function
Expenditure Minimization Problem	$p_1 \cdot x_1 + \dots + p_n \cdot x_n$ expenditure level (J.'s 'allowance')	$U(x_1, \dots, x_n) = \bar{u}$ desired utility level	x_1, \dots, x_n commodity levels	p_1, \dots, p_n, \bar{u} prices and utility level	$h_i(p_1, \dots, p_n, \bar{u})$ compensated demand functions	$e(p_1, \dots, p_n, \bar{u})$ expenditure function
Labor/Leisure Decision	$U(H, I)$ utility function	$I = I_0 + w \cdot (168 - H)$ budget constraint	H, I leisure time, disposable inc.	w, I_0 wage rate and nonwage income	$168 - H(w, I_0)$ labor supply function	$V(w, I_0)$ indirect utility function
Consumption/Savings Decision	$U(c_1, c_2)$ utility function	$c_2 = I_2 + (1+i) \cdot (I_1 - c_1)$ budget constraint	c_1, c_2 consumption levels	I_1, I_2, i income stream and interest rate	$c_1(I_1, I_2, i), c_2(I_1, I_2, i)$ consumption functions	$V(I_1, I_2, i)$ indirect utility function
Long Run Cost Minimization	$w \cdot L + r \cdot K$ total cost	$F(L, K) = Q$ desired output	L, K factor levels	Q, w, r desired output and factor prices	$L(Q, w, r), K(Q, w, r)$ output-constrained factor demand functions	$LTC(Q, w, r)$ long run total cost function
Long Run Profit Maximization (in terms of Q)	$P \cdot Q - LTC(Q, w, r)$ total profit	none	Q output level	P, w, r output price and factor prices	$Q(P, w, r)$ long run supply function	$\pi(P, w, r)$ long run profit function
Long Run Profit Maximization (in terms of L and K)	$P \cdot F(L, K) - w \cdot L - r \cdot K$ total profit	none	L, K factor levels	P, w, r output price and factor prices	$L(P, w, r), K(P, w, r)$ factor demand functions	$\pi(P, w, r)$ long run profit function