ECON 200A (first half) MICROECONOMICS: DECISIONS

Fall 2014 Monday, Wednesday 11:00am-12:20pm Econ Bldg 200

Mark Machina Econ Bldg 217 Office Hours: Mon 1:00-4:00pm

TA: John Rehbeck Sequoyah Hall 207 Tue & Thu 10:00-11:00am

The texts for the 200A/B/C sequence are:

Kreps, D., *A Course in Microeconomic Theory.* Princeton: Princeton Univ. Press, 1990.

Mas-Colell, A., M. Whinston and J. Green ("MWG"), *Microeconomic Theory,* Oxford: Oxford Univ. Press, 1995.

Varian, H., *Microeconomic Analysis, 3rd ed.* New York: W.W. Norton & Co., 1992.

There will also be a Mathematical Handout and additional in-class handouts.

An extremely useful book of problems, designed to hone your analytical ability is:

Dixon, P., S. Bowles and D. Kendrick, *Notes and Problems in Microeconomic Theory*, 1985, (Amsterdam: North-Holland)

Other useful readings include the relevant chapters of:

Debreu, G., *Theory of Value*, 1959, (New York: Wiley).

Henderson, J. and R. Quandt, *Microeconomic Theory: A Mathematical Approach,* 3rd ed., 1980 (New York: McGraw-Hill)

Malinvaud, E., *Lectures on Microeconomic Theory,* 1972 (Amsterdam: North-Holland)

Russell, R. and M. Wilkinson, *Microeconomics: A Synthesis of Modern and Neoclassical Theory*, 1979, (New York: Wiley)

The exam for this half of 200A will be Wednesday November 5. The exam for the second half will be given at the end of the quarter, and each exam will have equal weight.

http://www.econ.ucsd.edu/~mmachina/courses/ECON_200A/ECON_200A.html

ECONOMICS 200A (first half) COURSE OUTLINE

Fall 2014 **Mark Machina**

I. INTRODUCTION AND BASIC MATHEMATICAL IDEAS

a. Some Introductory Ideas

Domain of Microeconomic Analysis
Role of Models in Economics
The Circular Flow Diagram
Stocks versus Flows and the Dimensions of Economic Variables

b. Elasticity

c. Level Curves of Functions

Formula for the Slope of a Level Curve
Gradient Vectors and their Relation to Level Curves

d. Possible Properties of Functions

Cardinal vs. Ordinal Properties of Functions
Scale Invariance and Constant Returns to Scale
Homogeneity and Euler's Theorem
Homotheticity
Concavity and Convexity
Quasiconcavity and Quasiconvexity
Additive and Multiplicative Separability

e. Systems of Linear Equations and Cramer's Rule

II. MATHEMATICS OF OPTIMIZATION

a. The General Structure of Optimization Problems

Objective Functions, Control Variables, Parameters, Constraints
Solution Functions and Optimal Value Functions

b. Unconstrained Optimization

First Order Conditions
Second Order Conditions

c. Constrained Optimization

First Order Conditions
- Lagrangians
- Corner Solutions
- Shadow Prices of Constraints

Second Order Conditions

d. Comparative Statics of Solution Functions – Implicit Differentiation

Differentiation of the First Order Conditions
A Related Application: Comparative Statics of Equilibria

e. Comparative Statics of Optimal Value Functions – The Envelope Theorem

Unconstrained Case: Differentiation of the Objective Function
Constrained Case: Differentiation of the Lagrangian

III. CONSUMER PREFERENCES AND THE UTILITY FUNCTION

a. The Choice Space

- The Objects of Choice
- The Relevant Time Period
- The Issue of Divisibility

b. Preference Relations

- Definitions and General Properties of Preference Relations
  - Defined over Commodity Bundles, *not* Individual Commodities
  - Weak Preference, Strict Preference and Indifference
  - Completeness, Reflexivity and Transitivity
- Possible Additional Properties of Preference Relations
  - Continuity
  - Weak Monotonicity/Strong Monotonicity/Local Nonsatiation
  - Weak Convexity/ Strong Convexity
- Equivalent Variation versus Compensation Variation
- The Theory of Revealed Preference
  - Representation of a Choice Function by a Preference Relation
  - Revealed Preference over Budget Sets

c. Indifference Curves and the Marginal Rate of Substitution

- Better-Than Sets, Worse-Than Sets and Indifference Sets
- Typical Properties of Indifference Curves
  - One Through Each Point
  - Downward Sloping and "Thin"
  - Can't Cross
- Marginal Rate of Substitution (MRS)
  - Definition of MRS
  - Graphical Interpretation: Slope of the Indifference Curve
  - Convexity of Preferences and the Hypothesis of Diminishing MRS

d. Utility Functions

- Representation of a Preference Ranking by a Utility Function
- Monotonic Invariance of Utility Functions
- Possible Properties of a Utility Function:
  - Weak/Strong Monotonicity
  - Weak/Strong Quasiconcavity
  - Homotheticity
  - Additive/Multiplicative Separability
- Expressing the MRS in Terms of Marginal Utilities
- Monotonic Invariance of the MRS
- Hypothesis of Diminishing MRS
  - Algebraic Condition for Hypothesis of Diminishing MRS
- Important Examples of Utility Functions
  - Linear
  - Cobb-Douglas
  - Leontief
  - Constant Elasticity of Substitution (CES)
  - Quasilinear

IV. 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
  - Monotonic Invariance of the First Order Conditions
  - Corner Solutions
- Economic Interpretation of the Lagrangian Multiplier
- Second Order Conditions (Hypothesis of Diminishing MRS)
- Algebraic Examples: Cobb-Douglas, Leontief, Linear

b. Regular ("Marshallian") 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

c. The Indirect Utility Function

- Properties:
  - Increasing in Income, Nonincreasing in Prices
  - Scale Invariant in Prices and Income
  - Quasiconvex in Prices and Income
- Roy's Identity
- Price Indifference Curves
- Effect of Monotonic Transformation of Utility
- Examples: Cobb-Douglas, Leontief, Linear
- Justification of the Two-Good Approach: The Composite Commodity Theorem

d. Compensated ("Hicksian") Demand Functions and the Expenditure Function

- The Expenditure Minimization Problem
  - First Order Conditions for Expenditure Minimization
- Compensated ("Hicksian") Demand Functions
  - Properties:
    - Scale Invariant in Prices
    - Nonincreasing in "Own Price"
  - Identities Linking the Marshallian and Hicksian Demand Functions
  - Examples: Cobb-Douglas, Leontief, Linear
- The Expenditure Function
  - Properties:
    - Increasing in Utility, Nondecreasing in Prices
    - Homogeneous of Degree One in Prices
    - Concave in Prices
  - Identities Linking the Expenditure and Indirect Utility Functions
- Consumer Surplus

V. COMPARATIVE STATICS OF DEMAND

a. Changes in Income

- Income-Consumption Loci
- 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
- Relationship Between Income Elasticities for All Goods

b. Changes in Prices

- Price-Consumption Loci
- Graphical Derivation of Marshallian Demand Curves
- Own Price Elasticity
  - Price Elasticity and Budget Shares
- Cross Price Elasticity
  - Gross Substitutes and Gross Complements
- Algebraic Derivation of the Effect of a Price Change
- Relationship Between All Price and Income Elasticities for a Good

c. Compensated Price Changes

- Graphical Illustration of a Compensated Price Change
- Algebraic Derivation of the Effect of a Compensated Price Change
- Nonpositivity of Own Compensated Price Effect
- Compensated Cross Price Elasticity
  - Net Substitutes and Net Complements

d. The Slutsky Equation

- Graphical Illustration of the Slutsky Decomposition
- Algebraic Statement and Proofs
- Giffen Goods

VI. 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 the Discounted Present Value of a Stream
- Relationship between the Rental Rate and the Price of Capital
- Intertemporal Utility Maximization
  - First Order Conditions and Interpretation
- Comparative Statics: Income and Substitution Effects

VII. CHOICE UNDER UNCERTAINTY

a. Objective Uncertainty

Objects of Choice and Preference Functionals
Structure of Expected Utility Preferences
    Axiomatic Characterization of Expected Utility
Arrow-Pratt Characterization of Comparative Risk Aversion
    Risk Aversion and Wealth
Rothschild-Stiglitz Characterization of Comparative Risk
Demand for Insurance

b. Subjective Uncertainty

States, Events, Outcomes and Acts
Probabilistic Sophistication
Expected Utility Preferences over Subjective Acts
    State-Dependent Utility

c. Evidence and Alternative Models

Evidence on the Independence Axiom
Non-Expected Utility Preference Functionals
    Generalized Expected Utility Analysis
Evidence on Probabilistic Sophistication and the Stability of Preferences

VIII. SPECIFICATION AND ESTIMATION OF DEMAND, COST AND SUPPLY

a. Parametric Estimation of Demand Systems

b. Parametric Estimation of Production and Cost Systems

c. Nonparametric Testing of the Maximization Hypothesis

ECONOMICS 200A (first half): READINGS BY TOPIC

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I. Introduction and Basic Mathematical Ideas

Required: Math Handout, Sections A through F; Kreps Ch.1

Also suggested: MWG App.A-E; Varian Ch.26

II. Mathematics of Optimization

Required: Mathematical Handout, Sections G through I

Also suggested: Kreps App.1; MWG App. J-L; Varian Ch.27

III. Consumer Preferences and the Utility Function

Required: Kreps Sect.2.1; MWG Ch.1, Sects.2A -2C,3A - 3C; Varian Sect. 7.1

Also suggested: Suggested readings will be provided in an in-class handout

IV. Utility Maximization and Demand Functions

Required: Kreps Ch.2; MWG Sects.2D,3D; Varian Sects.7.2-7.5

Also suggested: Henderson & Quandt, Sects.2.1-2.3

V. Comparative Statics of Demand

Required: MWG Sects.2E-2F, 3E-3J; Varian Chs. 8, 9

Also suggested: MWG Ch.4; Varian Ch.10, Henderson & Quandt, Sects.2.5-2.7

VI. Supply of Factors of Production

Required: MWG Sects.20A-20D; Varian Ch.19

Also suggested: Kreps Ch.4, Sect.6.5; MWG Sects.19A-19B

VII. Choice Under Uncertainty

Required: Kreps Ch.3; MWG Ch.6; Varian Ch.11;

Required: Pratt J. (1964). "Risk Aversion in the Small and in the Large," *Econometrica* 32, 122-136.

Also suggested: Rothschild, M. & J. Stiglitz (1970). "Increasing Risk: I. A Definition," *Journal of Economic Theory* 2, 225-243;

Machina, M. (1987). "Choice Under Uncertainty: Problems Solved and Unsolved," *Journal of Economic Perspectives,* Summer 1987.

VIII. Specification and Estimation of Demand, Cost and Supply

Required: Varian Ch.12

Required: Ch. 3 of Deaton & Muellbauer (1980), *Economics and Consumer Behavior*.

FAMOUS OPTIMIZATION PROBLEMS IN ECONOMICS

Optimization Problem	Objective Function	Constraint	Control Variables	Parameters	Solution Functions	Optimal Value Function
Consumer's Problem	$U(x_1,...,x_n)$ utility function	$p_1 \cdot x_1 + ... + p_n \cdot x_n = I$ budget constraint	$x_1,...,x_n$ commodity levels	$p_1,...,p_n, I$ prices and income	$x_i(p_1,...,p_n,I)$ regular demand functions	$V(p_1,...,p_n,I)$ indirect utility function
Expenditure Minimization Problem	$p_1 \cdot x_1 + ... + p_n \cdot x_n$ expenditure level	$U(x_1,...,x_n) = u$ desired utility level	$x_1,...,x_n$ commodity levels	$p_1,...,p_n, u$ prices and utility level	$h_i(p_1,...,p_n, u)$ compensated demand functions	$e(p_1,...,p_n, u)$ 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	$L(w,I_0) \equiv 168 - H(w,I_0)$ labor supply function	$V(w,I_0)$ indirect utility function
Intertemporal Optimization	$U(c_1,...,c_n)$ utility function	$\sum_{t=1}^{n} (1+i)^t \cdot (I_t - c_t) = 0$ budget constraint	$c_1,...,c_n$ consumption levels	$I_1,...,I_n, i$ income stream and interest rate	$c_i(I_1,...,I_n, i)$ consumption functions	$V(I_1,...,I_n, i)$ 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 demands	$LTC(Q,w,r)$ 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, 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
Long Run Profit Maximization (in terms of Q, L, K)	$P \cdot Q - w \cdot L - r \cdot K$ total profit	$F(L,K) = Q$ production function	Q, L, K output and factor levels	P, w, r output price and factor prices	$Q(P,w,r), L(P,w,r), K(P,w,r)$ output supply & factor demand functions	$\pi(P,w,r)$ long run profit function