Summary of topics for final exam
Econ 100M: Intermediate Microeconomics, Math Intensive
Winter 2012
Professor Justin Marion

1. Math concepts useful in economics
   a. Constrained optimization
   b. Dual problem
   c. Total differential
   d. Implicit function theorem
   e. Envelope theorem

2. Preferences in general
   a. Notation
   b. Basic assumptions – Completeness, transitivity. What are the definitions? Think of an example where completeness doesn’t hold
   c. More restrictive assumptions – Monotonicity, convexity

3. Utility
   a. Ordinal vs. cardinal
   b. Monotonic transformation
   c. Marginal utility
   d. Marginal rate of substitution (definition: MRS = ratio of marginal utilities. Be able to find using total differential of utility where dU=0, or from dx₁/dx₂ using implicit function theorem)
   e. Indifference curves (mapping contour line of utility). Be able to draw a typical indifference curve for a given utility function. Why does the marginal rate of substitution tell you the slope of the indifference curve?
   f. Types of utility functions – perfect complements, perfect substitutes, Cobb-Douglas, quasilinear

4. Budget Constraint
   a. Draw the budget line and budget set
   b. What is the slope of the budget line and what is the interpretation of the slope (think of it like a rate of exchange)
   c. Represent price changes and income changes graphically
   d. Draw nonlinear budget constraints, as with quantity discounts

5. Choice: Utility maximization \(\rightarrow\) demand
   a. Solve consumer choice problem( be able to solve them generally, not just for Cobb-Douglas preferences)
   b. Find demand functions as a result of solving the utility maximization problem
   c. Find indirect utility from demand functions
   d. Understand meaning of MRS=-p₁/p₂
   e. Be able to interpret Lagrange multiplier
   f. When do you run into corner solutions? Be able to solve a problem with quasilinear preferences where a corner solution results
   g. How to solve for special cases (perfect substitutes, perfect complements)
6. Dual problem: expenditure minimization
   a. Set up expenditure minimization function
   b. Solve the problem to find compensated demand
   c. Be able to use indifference curve graph to describe how compensated demand responds to price changes
   d. Use compensated demand to derive expenditure function

7. Individual demand
   a. Income elasticity
   b. Price elasticity
   c. Definitions of normal vs inferior goods
   d. Definitions of ordinary vs Giffen good
   e. Substitutes vs. complements

8. Income and substitution effects
   a. Graphical representation
   b. How to solve for I+S effects
   c. Law of demand
   d. Effect of change in wage on labor supply

9. Welfare effects of price changes
   a. Consumer surplus
   b. Compensating variation
   c. Equivalent variation

10. Technology
    a. Production function
    b. Isoquant curve, isocost curve
    c. Marginal product
    d. Returns to scale
    e. Technical rate of substitution

11. Cost minimization
    a. Solve cost min problem → conditional factor demands → cost function
    b. Short-run vs. long-run cost minimization

12. Cost curves/firm supply
    a. Graph of AC, AVC, AFC, MC
    b. Supply curve of a profit maximizing firm in a competitive market
    c. Firm profits, producer surplus on this graph

13. Industry (or market) supply/market equilibrium
    a. Industry supply: horizontal sum of firm supply
    b. Competitive market equilibrium: market demand = industry supply
    c. Efficiency of competitive equilibrium
    d. Deadweight loss
    e. Effects of interventions like price control, tax
    f. Long run vs. Short run equilibrium (free entry)

14. Monopoly
    a. Marginal revenue
    b. Show graphically monopoly choice of output
    c. Find Q, P when monopoly
    d. Mark-up pricing
    e. DWL of monopoly

15. Non-uniform pricing
    a. Conditions you need to price discrim.
    b. Types of price discrimination
c. How price discrim. increases monopoly profits, efficiency

16. Game theory
   a. Strategies, payoffs
   b. Dominant strategy; equilibrium in dominant strategies
   c. Nash equilibrium (can be many, none, one)
   d. Nash equilibrium not necessarily Pareto efficient
   e. Sequential games
   f. Mixed strategies, equilibrium in mixed strategies

17. Oligopoly
   a. Cournot model
      i. Set up profit function
      ii. Solve for reaction curve
      iii. Show graphically Nash equilibrium – intersection of reaction curves
   b. Stackelberg model – set up like Cournot, but instead one firm chooses output first