

**Final Exam Study Guide<sup>1</sup>**

*Chronological order of topics covered in class (to the best of my memory).*

Introduction to Microeconomics (Chapter 1)

- What is microeconomics?
- What are models and why are they used?
- Simplifications used in models
- Positive vs. normative statements

Math Review (see online notes)

- Finding slopes, intercepts, and graphing lines.
- Rules of exponents and logs.
- First-order derivatives. Partial derivatives.

Review of Supply and Demand (Chapter 2)

- Determinants of demand (income, tastes and preferences, future price expectations, etc.).
- Quantity demand vs. demand curve.
- Law of demand.
- Demand functions,  $D(p)=a-bp$ .
- Determinants of supply.
- Quantity supplied vs. supply curve.
- Supply functions,  $S(p)$
- Market equilibrium. I.e. intersection of demand and supply. Be able to calculate it and graph it.
- Shifts in demand and supply curves and their effects on equilibrium.
- Price ceilings, price floors. Minimum wage laws. What affect do they have on equilibrium?

Applying the Supply and Demand Model: Welfare, Elasticities (Chapters 3 and 9.1, 9.2, 9.3, 9.4)

- How shapes of the demand and supply curves affect equilibrium after a shock.
- Price elasticity of demand. Know formula, nomenclature, how to calculate it.
- Elasticity along a linear demand curve (Figure 3.2).

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<sup>1</sup> More technically, an “abbreviated list of topics admissible on the final exam.”

- Income elasticity, cross-price elasticity. Know formula, definition, how to calculate.
- Price elasticity of supply.
- Elasticity along a supply curve (Figure 3.5).
- Effects of taxes: 1) sales tax or ad valorem tax; 2) specific tax or unit tax. Know difference and applications of each.
  - How tax effects depend on elasticities. Formula 3.6.
  - Tax incidence of a specific tax. Formula 3.7
- Consumer and producer surplus. Know definitions, how to calculate them. Welfare=CS+PS. Perfect competition maximizes welfare.
  - How CS and PS changes as equilibrium prices change. Figure 9.3.
- Deadweight loss (DWL). What is it? When do we observe it? Figure 9.5.

#### Consumer Choice, Utility, Utility Maximization (Chapter 4; handouts on utility max problems)

- How do consumers choose what bundles of goods to consume? They pick the ones that maximize their utility subject to their budget constraint.
- Preference theory: completeness, transitivity, more is better, reflexive.
- Indifference curves. Where do they come from? They come from preferences. Figure 4.1.
  - Properties of indifference curves: can't cross, slope downward, convex toward the origin, one exists for every possible bundle and the "higher" the IC the more preferred it is. Know how properties are derived from preference theory.
  - Be able to draw them for perfect substitutes, perfect complements, and imperfect substitutes.
  - Slope of the IC = marginal rate of substitution (MRS). Know how to calculate it. Diminishing MRS. Figure 4.3.
- Utility theory. What is a utility function? Tells us how much happiness/pleasure/satisfaction a consumer gets from consuming some bundle of goods.
  - Ordinal vs. cardinal. Utility is an ordinal concept. Relates back to philosophy.
  - Utility and indifference curves. How are they related? Answer: utility is constant anywhere along an IC. Higher IC's yield more utility.
  - Marginal utility ( $MU_x, MU_y$ ). Know that MRS is ratio of the marginal utilities of the two goods being consumed. Be careful! MU of the good on the x-axis **always** goes in the numerator.
- Budget constraints. Know what it is, how to write it out, how to graph it. Shifts in them (price changes cause pivots, income changes cause parallel shifts). Figure 4.8.
  - Slope of the BC = marginal rate of transformation (MRT). Equals the **negative** ratio of the prices.
  - Budget set or opportunity sets.
- Selection of the optimal bundle. Lagrangian method, MRS=MRT method, etc. Know how to solve these types of problems. Maximizing utility subject to a budget constraint. Solving for optimal consumption of goods. Be able to graph them. Figure 4.9 is good.
  - See Appendix on chapter 5 for math.

- Interior solution vs. corner solution.

### Applying Consumer Theory, Deriving Demand curves, Income and Substitution Effects (Chapter 5)

- Deriving demand curves. Comes from price changes in consumer market. Know how to do it graphically. Figure 5.1. Know it!
- Price consumption curve.
- Engel curve. Income consumption curve. Figure 5.2. Know difference between Engel and income consumption curves.
- Income elasticities as applied to normal and inferior goods. Know signs and definitions.
- At least one good must be normal (always). Income elasticities vary with income (on Exam #2).
- Income and substitution effects. **They are used to decompose a price change.** Know definitions, how to graph them. Figures 5.5 and 5.6. Know these well.

### Theory of the Firm and Firm Production (Chapter 6)

- What is a firm? It's a black box. Converts inputs into outputs using technology.
- Types of firms: private, public, for-profit, non-profit, etc.
- Assume in this class that all firms maximize profits. Profit=revenue-cost.
- Efficient production. Know definition. See Exam #2 question.
- Inputs: capital, labor, materials. Focus on capital and labor. What are they?
- Production function. Takes inputs converts them to output.  $Q=f(L,K)$ .
- Short-run vs. long-run production. Has to do with fixed inputs and nothing else.
- Short-run production with one fixed input. Be able to fill-in a table similar to Table 6.1.
  - Marginal product of labor/capital vs. average product of labor/capital. Know terms and how to calculate.
  - Rules of graphing  $MP_L$  and  $AP_L$ . **Marginals pull averages.**
- Law of diminishing marginal returns.
- Long-run production (all inputs are variable).
  - Isoquants curves. Know definitions and how to graph. Very similar to indifference curves. See Figures 6.2, 6.3, and 6.4.
  - Slope of isoquant = marginal rate of technical substitution (MRTS). How is it calculated? Derivative method and delta method. Figure 6.4. **Equation 6.5 is really really good to know.**
- Returns to scale: constant, decreasing, increasing. Be able to calculate them for a given production function. Are returns to scale always fixed for the firm? Answer: No! Firm can have DRS for some output levels and IRS for other output levels.
- Technological change. Add constant in front of production function.

## Costs of the Firm (Chapter 7)

- Economic efficiency. How is this different than productive efficiency?
- Economic costs vs. accounting costs. Know difference.
- Sunk costs.
- Short-run costs: fixed costs, variable costs, marginal costs, total costs, average variable costs, average fixed costs, average costs. 7 of them in the short-run. Know definitions and how to calculate each like in Table 7.1.
- Graphing short-run cost curves. This is important. Figure 7.1. Marginals pull averages. MC intersects AC and AVC at their minimum values. AC and AVC are “u-shaped” in theory. MC looks like a check mark.  $AC > AVC$  because of fixed costs.
- Shape of MC curve depends on wage and marginal product of labor. See Equation 7.1 and PowerPoint slide posted online for Ch. 7.
- Shape of the AC curve depends on wage and average product of labor. See Equation 7.2.
- Ignore effects of taxes on costs. We didn’t cover this.
- Long-run costs. All costs are variable in the long run!
  - Input choice problem. Firm must decide cost minimizing level of capital and labor to use.
  - Cost equation. Isocost equation. Graph isocost. What is it?
- Cost minimization problem. Three equivalent rules: 1) lowest-isocost rule; 2) tangency rule; 3) last dollar rule. Know how to graph cost minimizing bundle. Solve for it mathematically. I suggest the tangency rule:  $MRTS = \frac{w}{r}$ .
- Expansion paths. What are they? Graph them. Solve for them like on Exam #2.
- Economies of scale and diseconomies of scale. Relate back to returns to scale.
- Why are costs lower in the long run?
- Long-run cost curve is the envelope of short-run curves. Figure 7.9.
- Economies of scope. Don’t confuse with economies of scale.

## Competitive Markets and Profits (Ch. 8; selections)

- Perfectly competitive markets. Firms as price takers. Horizontal demand curve. Why? Answer: large number of buyers and sellers, perfect information, etc.
- Does the perfectly competitive market actually exist? No! It is a theoretical construct that economists only use as a benchmark.
- Ignore the stuff on residual demand curves.
- Profit maximization. Profit = total revenue – total cost. Two steps: 1) output decision; 2) shutdown decision.
  - Know the three output rules and two shutdown rules. Figure 8.2.
  - **Marginal revenue=marginal cost is the profit max condition.** Or,  $MR(q)=MC(q)$ , mathematically.  $MR(q)=p$  in the competitive market.

- Figure 8.3 is really important (panel b). Know how to graphically find the equilibrium profit level of output and how to calculate the profit (in dollars).
- Shutdown rule:  $p < AVC(q)$ . If true, then the firm cannot cover its average variable costs so should shut down. Fixed costs do not enter into the firm's shutdown decision in the short-run. Figure 8.4.
- Short-run supply curve for the firm. It is the MC curve above where  $p = AVC$  (the shutdown point).
- Short-run market supply curve. Know difference between market supply and firm supply. What happens to the market supply curve as more firms enter the market? Answer: becomes more elastic (horizontal). Figure 8.7.
- Short-run competitive equilibrium. Firm takes price decided in the market as given. Sets  $p = MC$  to get its profit max level of output. Figure 8.9.
- Long-run competition. Need to know that have free entry and exit in long-run. No fixed inputs. When will firms enter and exit the industry?

### Monopoly (Chapter 11; selections)

- What is a monopoly? Do they still exist today?
- How is the monopolist's profit max problem different than the competitive firm's? Answer: monopolist faces downward sloping demand curve so must lower the price of all units sold in order to sell an additional unit. Competitive firm takes price as given. Monopolist is a price setter. Figure 11.1
  - $MR = MC$  for monopolist. But,  $MR \neq p$  for the monopolist like for the competitive firm.
  - Marginal revenue curve for the monopolist. How does it relate to the demand curve? Answer: double the slope (i.e. steeper).
  - Monopolist sets  $MR = MC$  to determine profit max quantity output. Goes up to the demand curve to determine price. Figure 11.3.
- Are monopolies bad? No, consider a natural monopoly.
- Welfare effects of monopoly. They create DWL. Figure 11.5. Know that a monopoly reduces total welfare compared to a competitive firm.