

advanced microeconomics exam solutions

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Introduction

Advanced microeconomics is the cornerstone of graduate-level economics, blending rigorous theory with sophisticated analytical tools. Whether you're a first year graduate student, a professional seeking to sharpen your analytical edge, or an instructor preparing to assess your students, finding reliable **advanced microeconomics exam solutions** is essential. This article offers a deep dive into the most common topics, the structure of typical exams, and proven strategies for tackling complex problems. By the end, you'll be equipped with a toolkit that transforms daunting questions into manageable, solvable tasks.

Understanding the Landscape of Advanced Microeconomics

Before diving into exam solutions, it's vital to grasp the broader context of advanced microeconomics. The field expands on the foundational concepts of basic microeconomics—supply, demand, consumer choice, and firm behavior—and introduces more nuanced frameworks such as:

- Game theory and strategic interactions
- Information economics and asymmetric information
- General equilibrium theory and welfare analysis
- Dynamic optimization and intertemporal choice
- Market design, auctions, and matching markets
- Behavioral economics and bounded rationality

Mastery of these topics requires not only conceptual understanding but also proficiency in mathematical techniques: calculus, linear algebra, and sometimes differential equations. The exam questions often test your ability to synthesize theory with quantitative analysis.

Exam Structure and Common Question Types

Advanced microeconomics exams vary across institutions, but several patterns recur:

1. Short answer / Problem solving: Typically 2–4 questions that require a concise derivation or numerical answer.
2. Essay / Argumentative: One or two questions demanding a thorough written explanation of a theory or policy implication.
3. Case Studies: Real world scenarios where you apply models to analyze outcomes.
4. Multiple choice / True false: Often used to test quick recognition of key concepts.

Knowing the format helps you allocate time wisely and focus on the most demanding sections.

Core Topics and Their Typical Exam Questions

1. Consumer Theory and Utility Maximization

Students are asked to derive demand functions, compare indirect utility, or analyze the effects of price changes on consumer welfare. Typical problems include:

- Deriving Marshallian and Hicksian demand for a Cobb–Douglas utility function.

- Analyzing the income and substitution effects of a price shock.
- Computing the Slutsky matrix and interpreting its economic meaning.

2. Firm Theory and Production Functions

Exam questions often require the calculation of profit-maximizing output levels, cost minimization, or comparative statics. Common tasks:

- Finding the optimal input mix using the cost minimization problem.
- Comparing the efficiency of different production technologies.
- Deriving the long run average cost curve from a given short run cost function.

3. Market Structures and Strategic Behavior

Game theory becomes central here. Students must analyze Nash equilibria, dominant strategies, and mixed strategy solutions. Sample problems:

- Solving a Cournot duopoly with linear demand and constant marginal cost.
- Determining the Stackelberg leader–follower equilibrium.
- Analyzing a Bertrand competition with differentiated products.

4. General Equilibrium and Welfare

Questions often test the ability to prove the existence of equilibrium or to compute welfare changes from policy interventions. Typical tasks:

- Using the Brouwer fixed point theorem to prove the existence of equilibrium.
- Computing the compensating variation and equivalent variation for a tax.
- Analyzing the impact of a subsidy on consumer surplus and producer surplus.

5. Information Economics

Problems here focus on adverse selection, moral hazard, and screening mechanisms. Common exam questions include:

- Designing a menu of contracts to separate high and low risk types.
- Calculating the optimal insurance premium under asymmetric information.
- Analyzing the effect of signaling on market outcomes.

Strategic Approach to Exam Solutions

Effective exam performance hinges on a systematic approach that blends theory, mathematics, and critical thinking. Below is a step by step framework:

1. Read the question carefully: Identify the key concepts, variables, and the type of answer required.
2. Outline a plan: Write down the relevant equations, theorems, or models you'll need.
3. Execute the calculation: Perform algebraic manipulations or numerical computations with precision.
4. Interpret the result: Translate numbers back into economic language and discuss implications.
5. Check for errors: Verify units, signs, and logical consistency.

Adhering to this routine reduces mistakes and increases confidence.

Sample Advanced Microeconomics Exam Problems with Step by Step Solutions

Problem 1: Marshallian Demand for Cobb–Douglas Utility

Question: A consumer has a Cobb–Douglas utility function $U(x, y) = x^{0.4} y^{0.6}$, faces prices $p_x = 2$ and $p_y = 4$, and has income $m = 100$. Derive the Marshallian demand functions for x and y .

Solution:

1. Set up the Lagrangian: $L = x^{0.4} y^{0.6} + \lambda(100 - 2x - 4y)$
2. First order conditions:

$$\frac{\partial L}{\partial x} = 0.4 x^{-0.6} y^{0.6} - 2 = 0$$

$$\frac{\partial L}{\partial y} = 0.6 x^{0.4} y^{-0.4} - 4 = 0$$

$$\frac{\partial L}{\partial \lambda} = 100 - 2x - 4y = 0$$

- $(0.4/0.6)(y/x) = p_x/p_y \Rightarrow (2/3)(y/x) = 2/4 \Rightarrow y/x = 3/4$
- Thus $y = (3/4)x$.
- $2x + 4(3/4)x = 100 \Rightarrow 2x + 3x = 100 \Rightarrow 5x = 100 \Rightarrow x = 20$
- $y = (3/4) * 20 = 15$
- $x^*(p_x, p_y, m) = (m / (p_x + p_y)) * (0.4 / (0.4 + 0.6)) = (100 / 6) * 0.4 = 20$
- $y^*(p_x, p_y, m) = (m / (p_x + p_y)) * (0.6 / (0.4 + 0.6)) = (100 / 6) * 0.6 = 15$

Problem 2: Cournot Duopoly with Linear Demand

Question: Two firms produce a homogeneous product. Market demand is $P = 120 - Q$, where $Q = q_1 + q_2$. Each firm has constant marginal cost $c = 20$. Find the Cournot equilibrium quantities and profits.

Solution:

1. Profit for firm 1: $\pi_1 = (P - c)q_1 = (120 - q_1 - q_2 - 20)q_1$
2. First order condition for firm 1: $\frac{\partial \pi_1}{\partial q_1} = 100 - q_1 - q_2 = 0$
3. Similarly for firm 2: $\frac{\partial \pi_2}{\partial q_2} = 100 - q_1 - q_2 = 0$
4. Solve the system:

$$\text{Multiply first equation by 2: } 4q_1 + 2q_2 = 200.$$

$$5. \text{ Subtract second equation: } (4q_1 + 2q_2) - (q_1 + 2q_2) = 200 - 100 \Rightarrow 3q_1 = 100 \Rightarrow q_1 = 33.33.$$

$$6. \text{ Plug into first equation: } 2(33.33) + q_2 = 100 \Rightarrow q_2 = 33.33.$$

Problem 3: Adverse Selection in a Two Type Market

Question: A market has high risk (H) and low risk (L) consumers. The probability of H is 0.4 and L is 0.6. The insurer can offer a single insurance contract with premium π and coverage c . The loss probability is 0.5 for H and 0.1 for L. Determine the optimal premium if the insurer is risk neutral and aims to maximize expected profit.

Solution:

1. Expected loss for H: $E[L|H] = 0.5 * c$.
2. Expected loss for L: $E[L|L] = 0.1 * c$.
3. Expected loss in the market: $E[L] = 0.4 * 0.5c + 0.6 * 0.1c = (0.2 + 0.06)c = 0.26c$.
4. Profit: $\pi - E[L] = \pi - 0.26c$.
5. Since the insurer is risk neutral, the optimal premium equals expected loss: $\pi = 0.26c$.
6. Thus, the insurer should set the premium to 26% of coverage to break even on average.

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