

UCLA-ALIGNED COURSE FIELD NOTES

ECON 11

Microeconomic Theory

Calculus-based consumer, producer, cost, market, and strategic analysis

How these notes are written. I wrote each chapter the way I wish the material had been explained the first time: the real idea, the point where I usually get stuck, the simplest mental model that still stays honest, and a worked decision instead of a polished answer appearing from nowhere. Every chapter closes with practice and a fully written solution. If a sentence sounds impressive but does not help me solve or explain something, it does not belong here.

Daniel Mastick

Curriculum map, working notes, practice, and solutions

Course map

Week	Core thread	What should be solid by the end
1	Optimization and comparative statics	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
2	Preferences, utility, and consumer demand	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
3	Income and substitution effects	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
4	Technology, input choice, and cost	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
5	Competitive supply and market equilibrium	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
6	Monopoly and price discrimination	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
7	Oligopoly and game theory	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
8	Welfare, externalities, and information	Reconstruct the model, work an application, test its assumptions, and explain the result in ordinary language.
9	Integration studio	Combine several chapters in one case, preserve their assumptions, and reconcile the result across representations.
10	Cumulative review	Retrieve the full course map from memory and solve mixed problems without chapter labels.

Scope anchor: <https://catalog.registrar.ucla.edu/course/2025/ECON11?year=2025>. The sequence is aligned to the official catalog description and expanded into a practical ten-week study plan.

How I would use this packet

Treat each numbered section as one chapter. Read the formal explanation, pause at the student interpretation, and see whether the easy version still says the same thing. Rework the example without looking, then cover the solution in the chapter practice box. The cumulative set at the end is deliberately mixed: knowledge becomes durable when I have to choose the tool instead of being told which chapter I am in.

Contents

1	Optimization and comparative statics	5
1.1	Rebuild the chapter from first principles	5
1.2	Details I would refuse to skip	5
1.3	How this chapter connects	6
1.4	The full working model	6
2	Preferences, utility, and consumer demand	7
2.1	Rebuild the chapter from first principles	7
2.2	Details I would refuse to skip	8
2.3	How this chapter connects	8
2.4	The full working model	8
3	Income and substitution effects	10
3.1	Rebuild the chapter from first principles	10
3.2	Details I would refuse to skip	10
3.3	How this chapter connects	11
3.4	The full working model	11
4	Technology, input choice, and cost	12
4.1	Rebuild the chapter from first principles	12
4.2	Details I would refuse to skip	13
4.3	How this chapter connects	13
4.4	The full working model	13
5	Competitive supply and market equilibrium	15
5.1	Rebuild the chapter from first principles	15
5.2	Details I would refuse to skip	15
5.3	How this chapter connects	16
5.4	The full working model	16
6	Monopoly and price discrimination	17
6.1	Rebuild the chapter from first principles	17
6.2	Details I would refuse to skip	18
6.3	How this chapter connects	18

6.4	The full working model	18
7	Oligopoly and game theory	20
7.1	Rebuild the chapter from first principles	20
7.2	Details I would refuse to skip	20
7.3	How this chapter connects	21
7.4	The full working model	21
8	Welfare, externalities, and information	22
8.1	Rebuild the chapter from first principles	22
8.2	Details I would refuse to skip	23
8.3	How this chapter connects	23
8.4	The full working model	24

CHAPTER 1 Optimization and comparative statics

The idea

Constrained optimization turns objectives and feasible sets into first-order, second-order, corner, and envelope conditions. Comparative statics asks how an optimum changes when a parameter changes.

Rebuild the chapter from first principles

The claim I need to own is this: Constrained optimization turns objectives and feasible sets into first-order, second-order, corner, and envelope conditions. Comparative statics asks how an optimum changes when a parameter changes. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of optimization and comparative statics. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.
- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach optimization and comparative statics on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from the course foundations to preferences, utility, and consumer demand. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** Constrained optimization turns objectives and feasible sets into first-order, second-order, corner, and envelope conditions.
- **What moves.** Comparative statics asks how an optimum changes when a parameter changes.
- **What keeps the answer honest.** The model becomes useful only when I can apply optimization and comparative statics to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

I solve the economic problem, not just the derivative: the feasible set and boundary cases decide whether the calculus answer is real.

The easy version

Constrained optimization turns objectives and feasible sets into first-order, second-order, corner, and envelope conditions.

Worked example

Question. Maximize $10x - x^2$ over nonnegative x .

Walkthrough. The derivative is $10 - 2x$, giving $x = 5$. The second derivative is negative and $x = 5$ is feasible, so it is the unique maximum.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. Maximize $10x - x^2$ over nonnegative x .

Solution. The derivative is $10 - 2x$, giving $x = 5$. The second derivative is negative and $x = 5$ is feasible, so it is the unique maximum.

Practice 2. Explain optimization and comparative statics to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct optimization and comparative statics from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a optimization and comparative statics problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 2 Preferences, utility, and consumer demand

The idea

Completeness, transitivity, monotonicity, and convexity give a tractable preference representation. Marshallian demand solves utility maximization subject to the budget and separates interior tangency from corner choice.

Rebuild the chapter from first principles

The claim I need to own is this: Completeness, transitivity, monotonicity, and convexity give a tractable preference representation. Marshallian demand solves utility maximization subject to the budget and separates interior tangency from corner choice. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of preferences, utility, and consumer demand. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.
- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach preferences, utility, and consumer demand on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from optimization and comparative statics to income and substitution effects. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** Completeness, transitivity, monotonicity, and convexity give a tractable preference representation.
- **What moves.** Marshallian demand solves utility maximization subject to the budget and separates interior tangency from corner choice.

- **What keeps the answer honest.** The model becomes useful only when I can apply preferences, utility, and consumer demand to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

Utility numbers rank bundles; they are not happiness units I can compare across people.

The easy version

Completeness, transitivity, monotonicity, and convexity give a tractable preference representation.

Worked example

Question. With Cobb-Douglas utility and equal exponents, how is income divided?

Walkthrough. An interior consumer spends one half of income on each good. Quantities equal those expenditure shares divided by the respective prices.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. With Cobb-Douglas utility and equal exponents, how is income divided?

Solution. An interior consumer spends one half of income on each good. Quantities equal those expenditure shares divided by the respective prices.

Practice 2. Explain preferences, utility, and consumer demand to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct preferences, utility, and consumer demand from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a preferences, utility, and consumer demand problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent

check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 3 Income and substitution effects

The idea

A price change rotates the budget and combines substitution toward the relatively cheaper good with an income effect from changed purchasing power. Hicksian demand, expenditure minimization, and Slutsky decomposition make that distinction precise.

Rebuild the chapter from first principles

The claim I need to own is this: A price change rotates the budget and combines substitution toward the relatively cheaper good with an income effect from changed purchasing power. Hicksian demand, expenditure minimization, and Slutsky decomposition make that distinction precise. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of income and substitution effects. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.
- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.

- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach income and substitution effects on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from preferences, utility, and consumer demand to technology, input choice, and cost. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** A price change rotates the budget and combines substitution toward the relatively cheaper good with an income effect from changed purchasing power.
- **What moves.** Hicksian demand, expenditure minimization, and Slutsky decomposition make that distinction precise.
- **What keeps the answer honest.** The model becomes useful only when I can apply income and substitution effects to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

I draw the compensated budget before naming an income or substitution effect.

The easy version

A price change rotates the budget and combines substitution toward the relatively cheaper good with an income effect from changed purchasing power.

Worked example

Question. Can a Giffen good still obey a negative substitution effect?

Walkthrough. Yes. The substitution effect of a price increase reduces demand, but for a sufficiently inferior good the negative real-income effect raises demand by more and reverses the total effect.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. Can a Giffen good still obey a negative substitution effect?

Solution. Yes. The substitution effect of a price increase reduces demand, but for a sufficiently inferior good the negative real-income effect raises demand by more and reverses the total effect.

Practice 2. Explain income and substitution effects to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct income and substitution effects from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a income and substitution effects problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 4 Technology, input choice, and cost

The idea

Production sets, isoquants, marginal products, returns to scale, and cost minimization connect technology to conditional input demand and the cost function. Short-run constraints and long-run choice generate different cost curves.

Rebuild the chapter from first principles

The claim I need to own is this: Production sets, isoquants, marginal products, returns to scale, and cost minimization connect technology to conditional input demand and the cost function. Short-run constraints and long-run choice generate different cost curves. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what

stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of technology, input choice, and cost. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.
- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach technology, input choice, and cost on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from income and substitution effects to competitive supply and market equilibrium. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** Production sets, isoquants, marginal products, returns to scale, and cost minimization connect technology to conditional input demand and the cost function.

- **What moves.** Short-run constraints and long-run choice generate different cost curves.
- **What keeps the answer honest.** The model becomes useful only when I can apply technology, input choice, and cost to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

I keep diminishing marginal product separate from decreasing returns to scale; one changes a single input, the other scales all inputs.

The easy version

Production sets, isoquants, marginal products, returns to scale, and cost minimization connect technology to conditional input demand and the cost function.

Worked example

Question. A cost-minimizing firm uses labor and capital. State the interior tangency.

Walkthrough. The marginal product per dollar must match: marginal product of labor divided by wage equals marginal product of capital divided by rental rate, subject to producing the target output.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. A cost-minimizing firm uses labor and capital. State the interior tangency.

Solution. The marginal product per dollar must match: marginal product of labor divided by wage equals marginal product of capital divided by rental rate, subject to producing the target output.

Practice 2. Explain technology, input choice, and cost to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct technology, input choice, and cost from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a technology, input choice, and cost problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 5 Competitive supply and market equilibrium

The idea

A price-taking firm maximizes profit where price equals marginal cost on the upward-sloping region, with shutdown and exit conditions based on avoidable costs. Market supply aggregates firms and entry shapes long-run equilibrium.

Rebuild the chapter from first principles

The claim I need to own is this: A price-taking firm maximizes profit where price equals marginal cost on the upward-sloping region, with shutdown and exit conditions based on avoidable costs. Market supply aggregates firms and entry shapes long-run equilibrium. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of competitive supply and market equilibrium. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.

- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach competitive supply and market equilibrium on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from technology, input choice, and cost to monopoly and price discrimination. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** A price-taking firm maximizes profit where price equals marginal cost on the upward-sloping region, with shutdown and exit conditions based on avoidable costs.
- **What moves.** Market supply aggregates firms and entry shapes long-run equilibrium.
- **What keeps the answer honest.** The model becomes useful only when I can apply competitive supply and market equilibrium to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

My shorthand for this chapter is: my shorthand for this chapter is: zero economic profit still pays every opportunity cost, including normal return to capital and entrepreneurship.

The easy version

A price-taking firm maximizes profit where price equals marginal cost on the upward-sloping region, with shutdown and exit conditions based on avoidable costs.

Worked example

Question. When does a short-run competitive firm shut down?

Walkthrough. It shuts down when price is below minimum average variable cost, because revenue cannot cover avoidable operating cost. Fixed cost remains sunk in the short run.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. When does a short-run competitive firm shut down?

Solution. It shuts down when price is below minimum average variable cost, because revenue cannot cover avoidable operating cost. Fixed cost remains sunk in the short run.

Practice 2. Explain competitive supply and market equilibrium to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct competitive supply and market equilibrium from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a competitive supply and market equilibrium problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 6 Monopoly and price discrimination

The idea

A monopolist internalizes the effect of output on price, so marginal revenue differs from price. Markups relate to demand elasticity; discrimination requires market power, segmentation, and limits on resale.

Rebuild the chapter from first principles

The claim I need to own is this: A monopolist internalizes the effect of output on price, so marginal revenue differs from price. Markups relate to demand elasticity; discrimination requires market power, segmentation, and limits on resale. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the

definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of monopoly and price discrimination. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.
- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach monopoly and price discrimination on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from competitive supply and market equilibrium to oligopoly and game theory. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** A monopolist internalizes the effect of output on price, so marginal revenue differs from price.

- **What moves.** Markups relate to demand elasticity; discrimination requires market power, segmentation, and limits on resale.
- **What keeps the answer honest.** The model becomes useful only when I can apply monopoly and price discrimination to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

I calculate quantity first from marginal revenue equals marginal cost, then recover price from demand.

The easy version

A monopolist internalizes the effect of output on price, so marginal revenue differs from price.

Worked example

Question. Demand is $P=100-Q$ and marginal cost is 20. Find monopoly quantity and price.

Walkthrough. Total revenue is $100Q-Q$ squared, so marginal revenue is $100-2Q$. Set equal to 20: $Q=40$ and $P=60$.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. Demand is $P=100-Q$ and marginal cost is 20. Find monopoly quantity and price.

Solution. Total revenue is $100Q-Q$ squared, so marginal revenue is $100-2Q$. Set equal to 20: $Q=40$ and $P=60$.

Practice 2. Explain monopoly and price discrimination to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct monopoly and price discrimination from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a monopoly and price discrimination problem but never states a model or checks the result. Write the shortest useful

review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 7 Oligopoly and game theory

The idea

Normal-form games distinguish strategies, payoffs, best responses, dominance, Nash equilibrium, mixed strategies, repeated interaction, commitment, and sequential credibility. Cournot and Bertrand illustrate how the strategic variable changes market outcomes.

Rebuild the chapter from first principles

The claim I need to own is this: Normal-form games distinguish strategies, payoffs, best responses, dominance, Nash equilibrium, mixed strategies, repeated interaction, commitment, and sequential credibility. Cournot and Bertrand illustrate how the strategic variable changes market outcomes. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of oligopoly and game theory. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.

- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach oligopoly and game theory on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from monopoly and price discrimination to welfare, externalities, and information. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** Normal-form games distinguish strategies, payoffs, best responses, dominance, Nash equilibrium, mixed strategies, repeated interaction, commitment, and sequential credibility.
- **What moves.** Cournot and Bertrand illustrate how the strategic variable changes market outcomes.
- **What keeps the answer honest.** The model becomes useful only when I can apply oligopoly and game theory to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

I never call an outcome Nash until I check every player's unilateral deviation.

The easy version

Normal-form games distinguish strategies, payoffs, best responses, dominance, Nash equilibrium, mixed strategies, repeated interaction, commitment, and sequential credibility.

Worked example

Question. Two players choose left or right and prefer matching. What kind of equilibrium issue appears?

Walkthrough. There are two pure coordination equilibria, left-left and right-right, and generally a mixed equilibrium. Nash predicts mutual best responses but not which coordinated outcome is selected.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. Two players choose left or right and prefer matching. What kind of equilibrium issue appears?

Solution. There are two pure coordination equilibria, left-left and right-right, and generally a mixed equilibrium. Nash predicts mutual best responses but not which coordinated outcome is selected.

Practice 2. Explain oligopoly and game theory to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct oligopoly and game theory from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a oligopoly and game theory problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

CHAPTER 8 Welfare, externalities, and information

The idea

Efficiency links marginal willingness to pay with marginal social cost. Externalities, public goods, adverse selection, moral hazard, and principal-agent problems break standard market assumptions and motivate institutions or policy.

Rebuild the chapter from first principles

The claim I need to own is this: Efficiency links marginal willingness to pay with marginal social cost. Externalities, public goods, adverse selection, moral hazard, and principal-agent problems break standard

market assumptions and motivate institutions or policy. I do not count that as learned just because the sentence looks familiar. I should be able to name the objects, state what changes and what stays fixed, recover the rule from the definitions, and explain why the result is allowed.

The move

My working sequence

1. **Translate.** Rewrite the prompt in the language of welfare, externalities, and information. List the known quantities, the unknown, the units or types, and any hidden constraint.
2. **Choose.** State the theorem, model, algorithm, accounting rule, or physical law before substituting values. This is where I make the assumption visible.
3. **Execute.** Work one justified step at a time and keep intermediate state readable enough that I can audit it later.
4. **Verify.** Check a boundary case, sign, unit, invariant, order of magnitude, or alternative derivation. Then translate the result back into an ordinary sentence.

Details I would refuse to skip

- **Definitions:** I should be able to define every technical noun in the chapter without using that same noun in the definition.
- **Assumptions:** I write the condition that makes the method legal beside the method itself. A correct procedure under the wrong assumptions is still a wrong answer.
- **Representation:** I move freely among words, equations or code, a diagram, and a small numerical example. If one representation disagrees with another, that disagreement is useful evidence.
- **Failure modes:** I keep the nearest counterexample in mind: the boundary where the rule changes, the invariant breaks, or the model stops matching reality.
- **Communication:** My final answer names what the result means and what it does not establish. I do not let notation do the explanatory work for me.

Sanity check

Closed-note check. Can I teach welfare, externalities, and information on a blank page, derive or reconstruct its main rule, work a fresh example, and diagnose a deliberately broken solution? If I can only recognize the finished work, I am not done.

How this chapter connects

I read this chapter as the bridge from oligopoly and game theory to the cumulative course model. The earlier material supplies the language and constraints; this chapter adds a new reasoning move; the later material asks me to use that move without being told its name. That connection matters because exams and real projects mix chapters on purpose.

The full working model

- **Core claim.** Efficiency links marginal willingness to pay with marginal social cost.
- **What moves.** Externalities, public goods, adverse selection, moral hazard, and principal-agent problems break standard market assumptions and motivate institutions or policy.
- **What keeps the answer honest.** The model becomes useful only when I can apply welfare, externalities, and information to an unfamiliar case and defend the assumptions.
- **Mastery standard.** I can define the objects, rebuild the rule, work a fresh case, compare alternatives, and diagnose a broken solution without relying on recognition.

How I actually think about it

The welfare theorem is conditional; I keep its missing-market and information assumptions in the margin.

The easy version

Efficiency links marginal willingness to pay with marginal social cost.

Worked example

Question. Why can insurance create moral hazard?

Walkthrough. Coverage lowers the insured person's marginal cost of risky behavior or additional care after contracting. Deductibles, monitoring, experience rating, and contract design trade risk sharing against incentives.

Common miss

The fastest way to get this chapter wrong is to use the visible procedure without naming its assumption, units, time period, reference group, or boundary. I put that condition beside the work and verify the result independently.

Solved chapter practice

Practice 1. Why can insurance create moral hazard?

Solution. Coverage lowers the insured person's marginal cost of risky behavior or additional care after contracting. Deductibles, monitoring, experience rating, and contract design trade risk sharing against incentives.

Practice 2. Explain welfare, externalities, and information to a classmate using one definition, one concrete example, one assumption, and one failure mode.

Solution. Begin with the core claim above, use the worked case as the concrete example, state the condition highlighted by the warning, and choose a failure where that condition does not hold. A complete explanation connects all four pieces instead of listing them.

Mastery practice A. Reconstruct welfare, externalities, and information from a blank page. Include the central definition, the governing rule, one required assumption, and one boundary case.

Solution. Start from the blue idea box, but rewrite it in my own words. Identify the objects and state, name the rule before using it, copy the relevant assumption from the details audit, and choose a boundary where that assumption becomes equality or fails. A complete solution explains why each part belongs; a list of vocabulary is not enough.

Mastery practice B. A classmate gets a polished-looking answer to a welfare, externalities, and information problem but never states a model or checks the result. Write the shortest useful review of that solution.

Solution. I would ask four concrete questions: What exactly are the inputs and desired output? Which rule licenses the main step? Which assumption could invalidate it? Which independent check supports the conclusion? If the answer cannot survive those four questions, I treat the numerical or verbal result as unverified.

Cumulative study plan

I use this packet in three passes. First I reconstruct each model and work its examples without looking. Second I mix chapters so the tool is no longer named for me. Third I explain a complete case aloud, including assumptions, units, uncertainty, failure modes, and what evidence would change my conclusion.