

Chapter 2

Terms & Conditions

All non-cited graphs for this course made by me on [Desmos](#)

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Prerequisite Knowledge for This Class

- › This is a 200-level class, but it is a difficult 200-level class
- › Calculus is not required/used, but understanding it helps
 - Calculus is for the easy parts of economics anyway
- › What is required:
 - Economic terms (compliment, substitute, elasticity, diminishing, etc)
 - Manipulating graphs (quickly reviewed today)
 - Multivariable algebra

On Slides and Exams

- › Slides, lecture discussions, problem sets, [potential] practice exams cover all topics for our exams
- › However, you will not get an example for every potential question on an exam
 - The point should be to test critical thinking, not step memorization

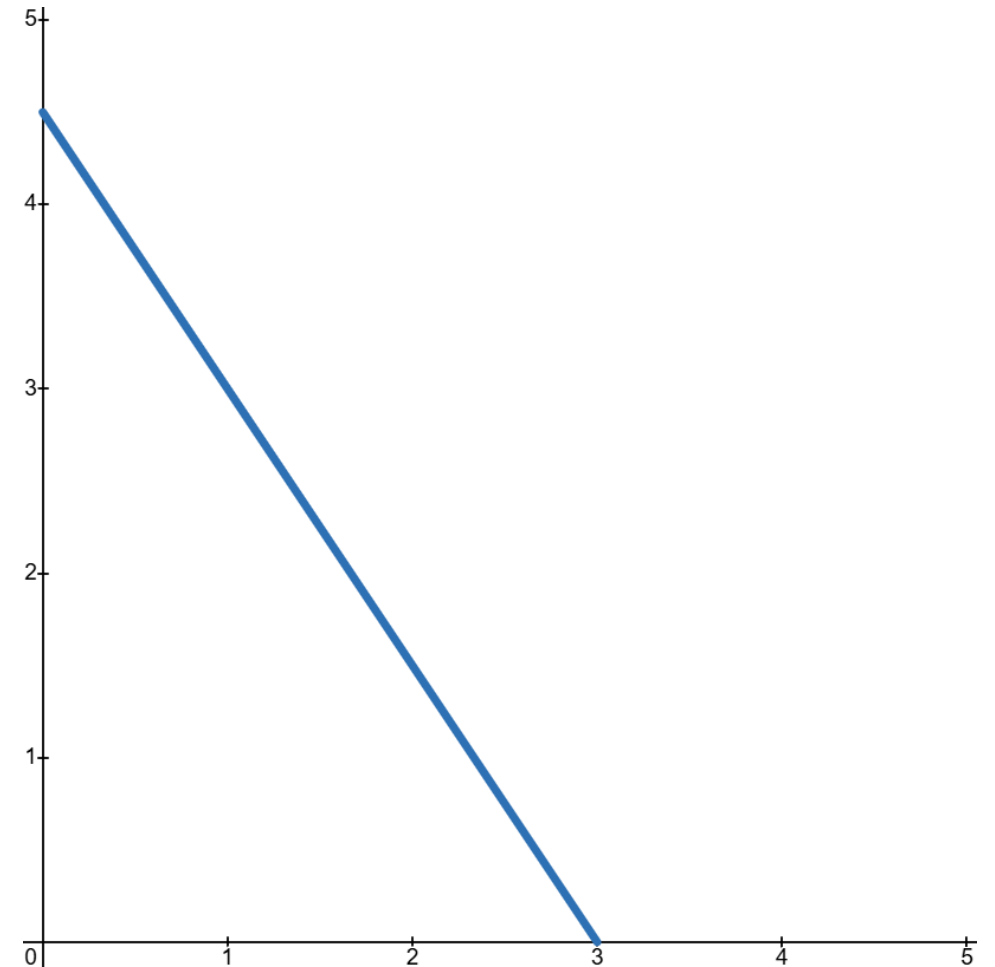
Critical Information

- › No two people learn the same way
 - No two professors have the same teaching style
 - I try my best to accommodate everyone's learning style, but I can't read minds
 - Sometimes the best question is "*I don't understand what we just did, but I also don't know what question to ask*"

- › Discussion isn't a competition.
 - The only purpose is to learn something new
 - Many times for me, that starts with being wrong

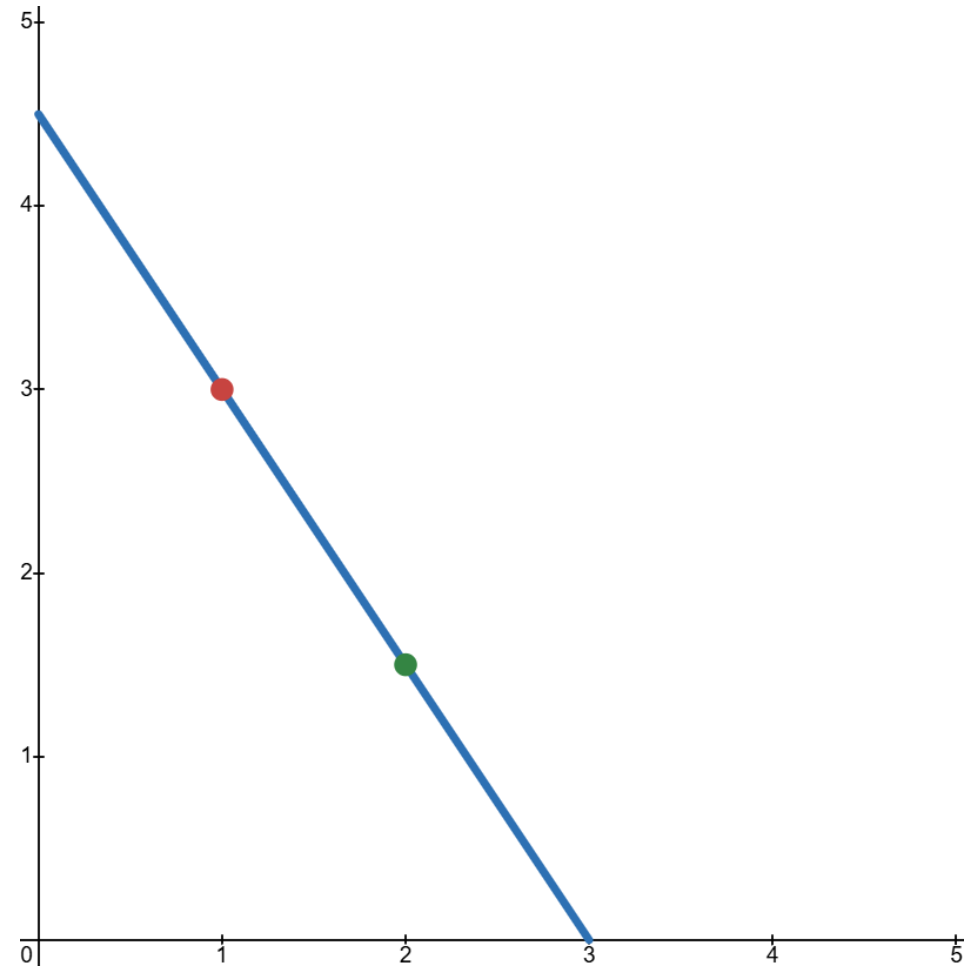
Graphing: lines

- › Equation of line: $y = mx + b$
 - y = vertical axis
 - x = horizontal axis
 - m = slope
 - b = vertical intercept
- › $y = -1.5x + 4.5$
- › Slope: change in y from changing x



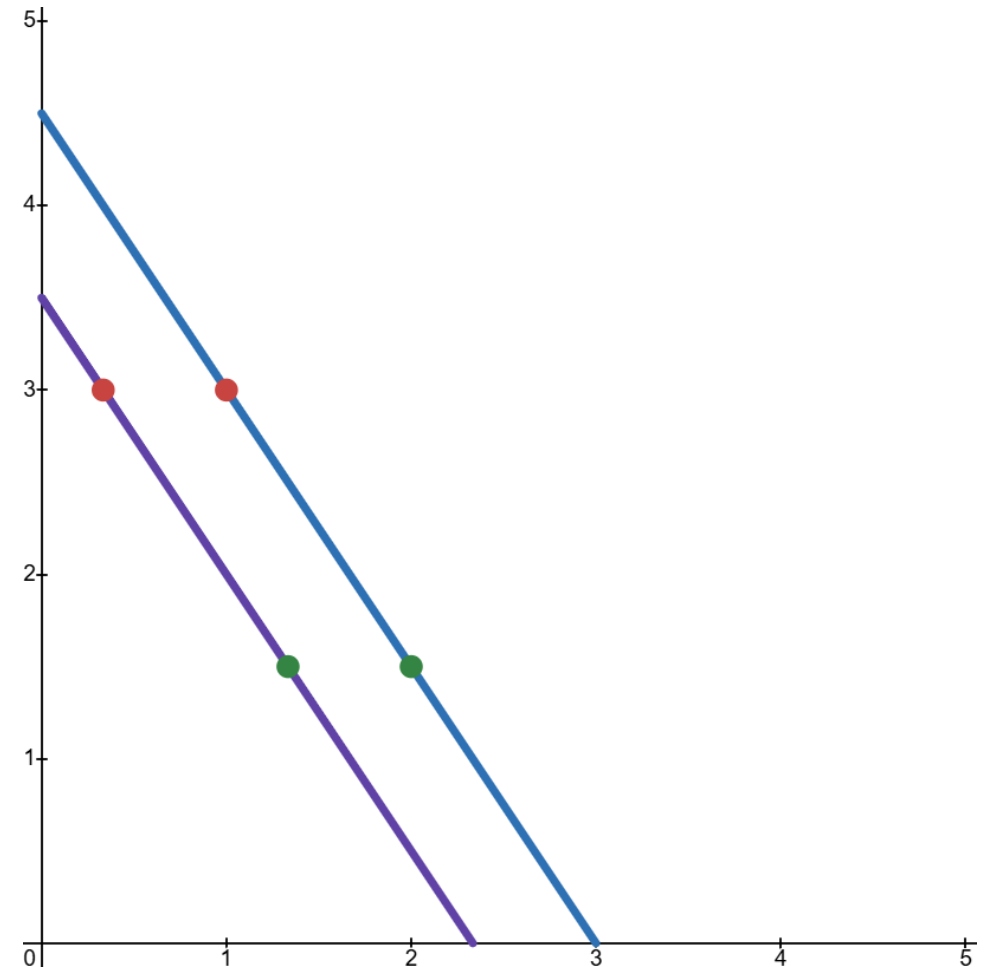
Graphing: points

- › Points are listed as (x,y)
 - First point: $(1,3)$
 - Second point: $(2,1.5)$
- › **Notice: CHANGING A POINT ON EITHER AXIS DID NOT MOVE THE LINE**
 - Just new (x,y) on $y = -1.5x + 4.5$



Graphing: shifting lines

- › Changing b will shift the line
 - Same y , but new x
- › Changes in b will have economic interpretation depending on the problem
 - E.g. capital breaks down faster so for a given interest rate, people invest less



Does It Matter How I Draw the Lines?

- › Mostly, no. If we explicitly state the slope, then it should be drawn [relatively] straight. If not, either of these is fine:

3 Key Effects for This Class

1. Wealth Effect
2. Substitution Effect
3. Diminishing Marginal Value

Wealth Effect

- › **Wealth Effect:** an increase in the present value of your lifetime wealth leads to more consumption of all goods
 - We assume goods are **normal**; demand increases with wealth
 - **Inferior** goods decrease with wealth (ex: fast food)
- › Includes future wealth
 - If you know you'll win the lottery in a month, you'll start spending some of that now
 - **Consumption smoothing:** people prefer stable consumption over time, not large jumps

Income Effect

- › Similarly, an **Income Effect** will change demand based on current real income
 - If your purchasing power increases, so does demand
- › When studying consumption over time, changes in current income can be understood as changes in lifetime wealth
 - We will analyze this through the lens of a wealth effect
 - › *My apologies to the supporters of Eugen Slutsky*

Substitution Effect

- › **Substitution Effect:** a change in the **relative price** of a good will lead consumers to substitute to the cheaper good
 - Price of one good in terms of another

- › Example of relative price:
 - Value of apples = 3
 - Value of oranges = 2
 - Rel. price of apples = 1.5

Diminishing Marginal Value

- › **Diminishing Marginal Value:** each additional unit will have a smaller effect on the total
 - Best explain by example. This is saved for Ch. 4
 - Still important to flag now

Economic Agents

- › 3 general economic agents:
 1. Households (HHs)
 2. Firms
 - 2.1 Banks mostly work in the background for our class
 3. Governments

- › Firms and HHs both have a “problem to solve”
 - Governments studied for policy analysis

Rationality

- › The HH's "problem" is to maximize utility, given constraints
 - **Utility** is any benefit from a choice made
 - Called "felicity" in some contexts; roughly akin to happiness
 - › Fun thought: if donating to charity brings utility, does altruism exist?
- › **Assumption of Rationality:**
 - HHs will try to maximize utility, given constraints
 - Firms will try to maximize value, given constraints

Rationality and Intelligence

- › I make no claims about intelligence (for myself included)
 - If dumpster diving for used coffee cups brings you the most utility, then that's what you'll do
 - Utility/value is subjective!!!!

- › Gathering information can cost time and money
 - May make some rational decisions appear irrational to others
 - Utility is subjective, including the utility of information

What is a Rational Choice?

- › A rational choice will satisfy the first two **choice axioms**
- › The **choice axioms** are the foundations of HH preferences
 - Based on relationships of goods (or baskets of goods)
 - Five in total
- › Notation used:
 - $\succ$ means “is preferred to”
 - $\succcurlyeq$ means “is at least as good as” or “weakly preferred to”
 - $\sim$ symbolizes indifference between options

Rationality of Preferences

- › Axioms for rationality:

- 1. Complete preferences:** consumers can make comparisons

- › Ex: apple $\succsim$ orange

- 2. Transitive preferences:** consumers are (basically) consistent

- › If: apple $\succ$ orange, and orange $\succ$ banana, then apple $\succ$ banana

- › No *intransitive* cycling (banana $\succ$ apple)

- › Are you allowed to change your mind?

- Of course! Time, thought effort, brain power, etc. are all variables

- Changing a variable changes the outcome

Indifference Curves

- › **Indifference curves (IC)** represent utility on a graph
- › Important properties:
 1. All points on the curve have the same utility
 2. The higher the IC, the more utility (ordinal)
 3. Infinite number of potential ICs for any combination of goods
- › We'll make some assumptions to standardize ICs
 - Different theory classes will look at different preferences
 - Macro generally uses “well behaved” ICs

Continuity Axiom

3. **Continuity:** ICs don't have gaps or jumps

- If apples $\succ$ oranges $\succ$ bananas, then for a particular $\lambda \dots$
 - $(\lambda)\text{apples} + (1-\lambda)\text{bananas} \sim \text{oranges}$
 - $\lambda \in (0,1)$
- Rules out Lexicographic preferences
- (Probably the definition that changes the most when using calculus)

› What does this mean for us?

- Rational preferences that are continuous can be described with a utility function (Debreu, 1954)

[Non] Satiety Axiom(s) (1/2)

- › **4a. Local Non-satiation:** there is always a small change you can make that will leave you better-off
 - Could be increasing *or decreasing* in quantity
 - Ex: having 3 cups of coffee is preferable to having 4

- › **4b. Weak Monotonicity:** more is never worse off
 - Do I need another book to go unread on my shelf?
 - No, but I'm not worse off if one showed up there

[Non] Satiety Axiom(s) (2/2)

- › **4c. Strict Monotonicity:** more is always better
 - Rules out perfect compliments (Leontief preferences)

- › What does this mean for us?
 - We essentially have 3 goods:
 1. Consumption today
 2. Consumption in the future
 3. Leisure (may occasionally touch on leisure in the future)
 - All else equal, the HH prefers more of all of these

Convexity Axiom(s) (1/2)

- › **5a. Weak Convexity:** a combination of 2 goods is at least as appealing as the lesser good
 - If apples $\succsim$ oranges, then...
 - $(\lambda)\text{apples} + (1-\lambda)\text{oranges} \succsim \text{oranges}$
 - All $\lambda \in [0,1]$
- › **5b. Strict Convexity:** same thing, but the combination will always be preferred to the lesser good
 - $(\lambda)\text{apples} + (1-\lambda)\text{oranges} \succ \text{oranges}$
 - All $\lambda \in (0,1)$
 - Rules out perfect substitutes

Convexity Axiom(s) (2/2)

- › What does this mean for us?
 - Helps us explain the marginal rate of substitution later
 - Final piece that gives IC's their curved appearance
 - *An increase in income means the HH will save some so they can have more consumption today and tomorrow*

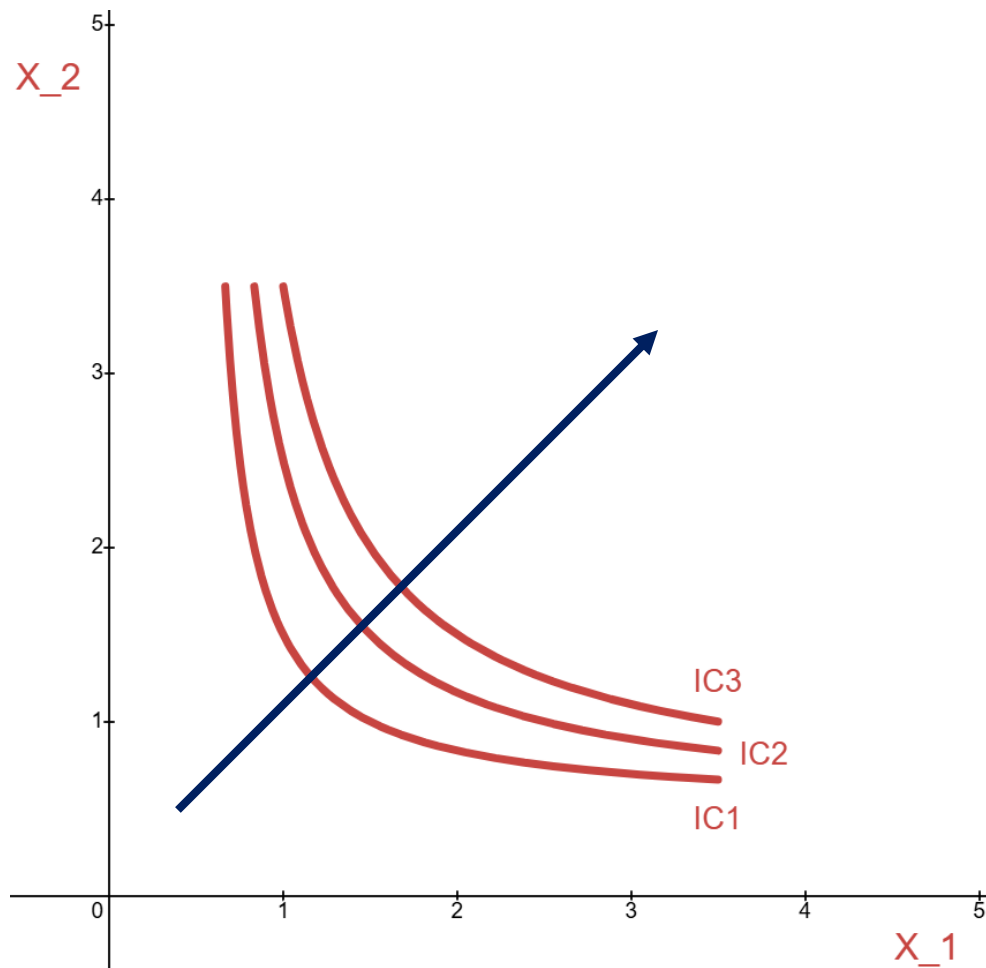
- › HHs don't only prefer 1 thing
 - Better to have multiple goods, experiences, sources of happiness than only one
 - *"Variety is the spice of life"* (Cowper, 1802)

The 'Macro' Cheat Sheet of Preferences

- A. Completeness + Transitivity = rational preferences
- B. Completeness + Transitivity + Continuity = utility function
 - A and B mostly work in the background for us
- C. Strict Monotonicity = HH likes more stuff
 - Solidifies our Wealth Effects
- D. Strict Convexity = Combos preferred to single extremes
 - We'll use this as a "calculus work around"
 - Solidifies consumption smoothing

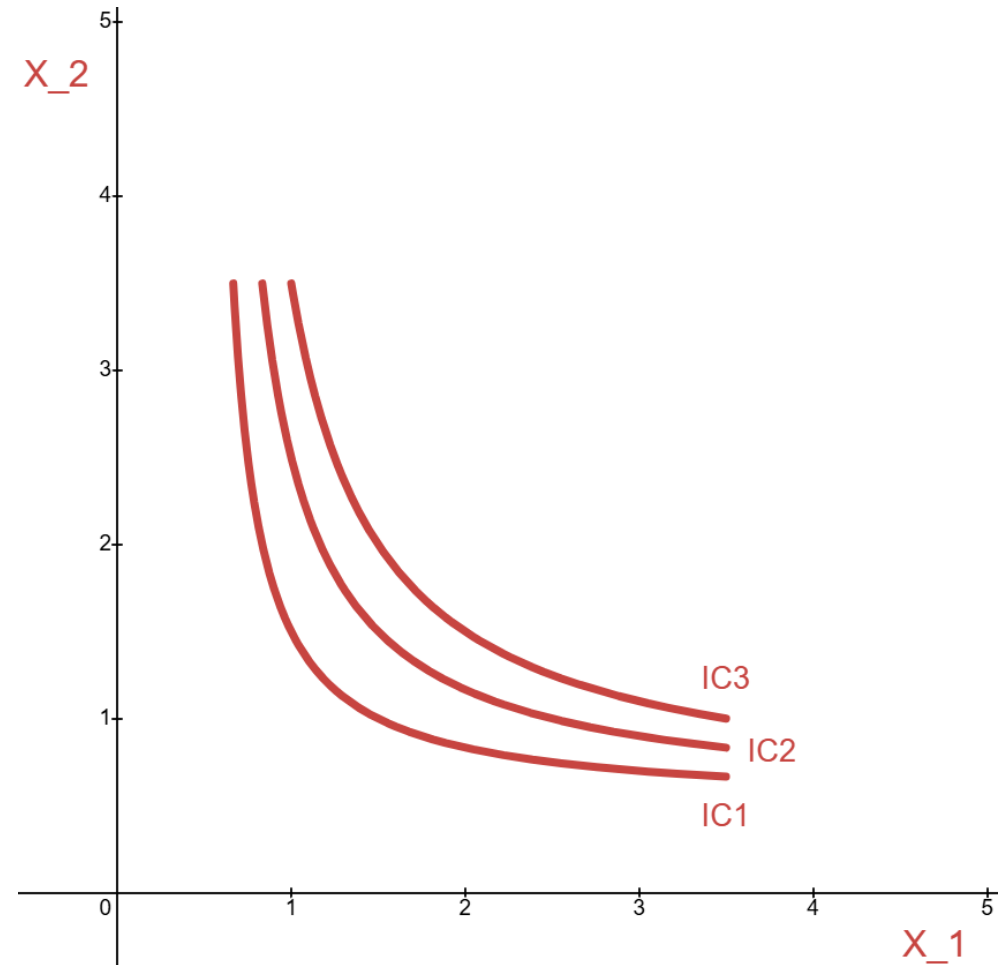
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Our “Well Behaved” Indifference Curves



Satisfying Conditions

- › Complete:
- › Transitive:
- › Continuous:
- › Strictly monotonic:
- › Strictly convex:





References

1. Cowper, William. *The Task: A Poem in Six Books*. No. 2094. E. Lincoln, 1802.
 2. Debreu, Gerard. "Representation of a preference ordering by a numerical function." *Decision processes* 3 (1954): 159-165.
- A. All non-cited graphs for this course made by me on [Desmos](#).

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