Indifference Curve Slides

Econ 360

Summer 2025

BINGHAMTON UNIVERSITY
STATE UNIVERSITY OF NEW YORK

Learning Outcomes

- Derive a graphical representation of preferences from words and/or equations.
- Predict consumer behavior and choices based on a graphical representation of preferences.
- Explain why indifference curves are generally downward sloping.
- Explain the slope of an indifference curve using the concepts of tradeoffs and preferences.

Where We Are

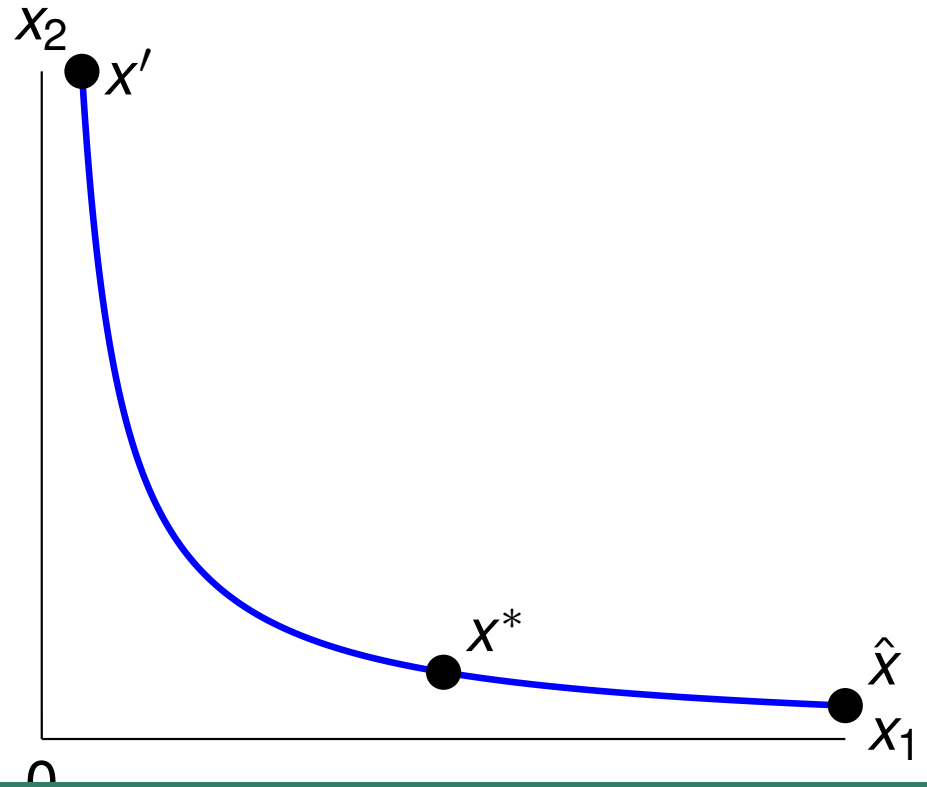
- In the previous slides, we talked about representing preferences in terms of two bundles x and y.
- We had 3 ways to compare bundles x and y:
  1. $x \succsim y$.
  2. $y \succsim x$
  3. $x \sim y$.
- But in a grocery store, there are thousands of possible grocery carts, or bundles, to choose from.
- We need a better way to represent preferences over bundles.
- Specifically, we need to more easily evaluate how any bundle compares to every other bundles.
- We can use an **indifference curve** to help us.

Indifference Curves

- **Indifference Curves** are sets of bundles which are equally preferred.
- Suppose you have a reference bundle x^*.
- Any bundle y that satisifies the preference relation $y \sim x^*$ will be on the same indifference curve as x^*.
- Or, the set of all bundles y that satisfy $y \sim x^*$ form a single indifference curve.
- Let's look at it graphically.

Indifference Curves

- Suppose we have two commodities to make it easy, x_1 and x_2.
- Our reference bundles will be x^* with two other bundles $\hat{x}$ and x'.
- Since $x^* \sim \hat{x} \sim x'$ all 3 bundles should be on the same indifference curve.



Indifference Curves: Goals

We want to use indifference curves to identify the following:

1. All the bundles exactly as preferred as x^*.
2. All the bundles more preferred to x^*.
3. The bundles less preferred to x^*.
4. The tradeoff for a consumer between the two commodites in the bundle x^*.

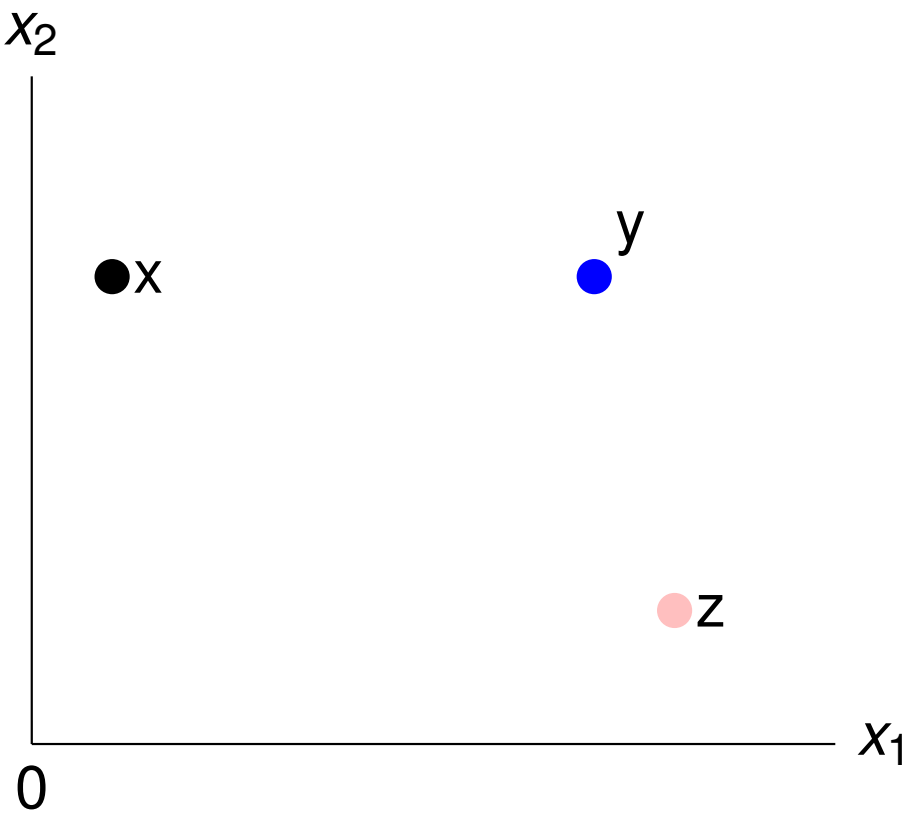
Indifference Curves: Goals

In order to do that, we will learn the following:

1. The better set.
2. The worse set.
3. The Marginal Rate of Substitution (MRS).
4. How to draw an indifference curve for **ANY** type of preferences..

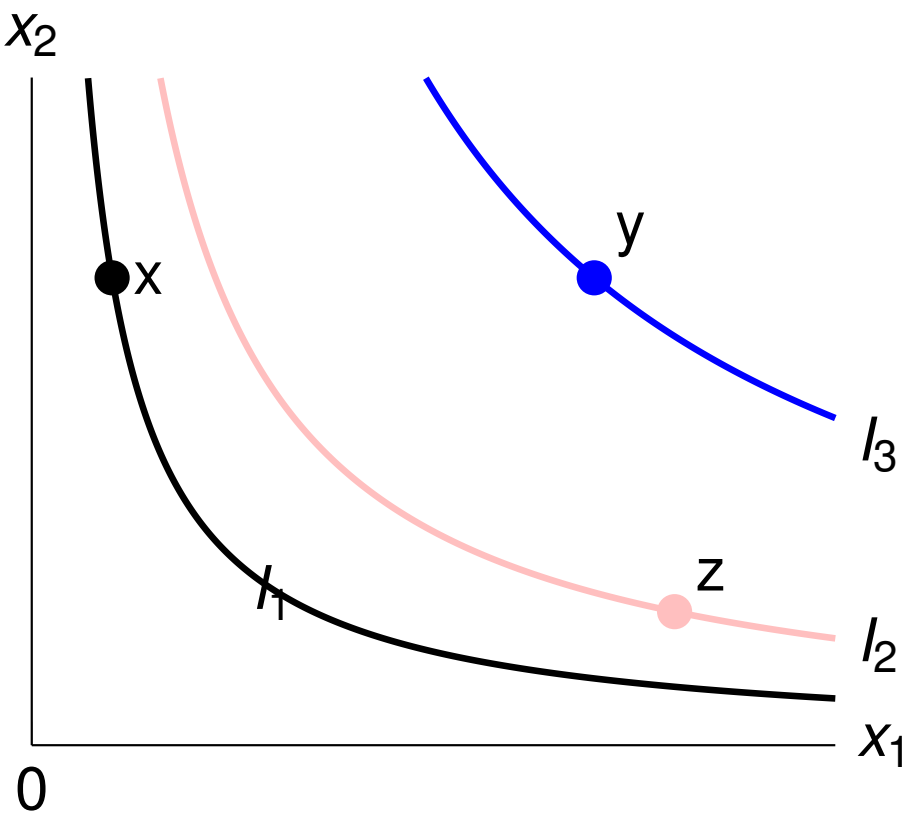
Ranking Bundles

- Suppose we have two commodites, and you like both.
- For me, I like Chipotle bowls and Moes stacks.
- How would you rank the following bundles?



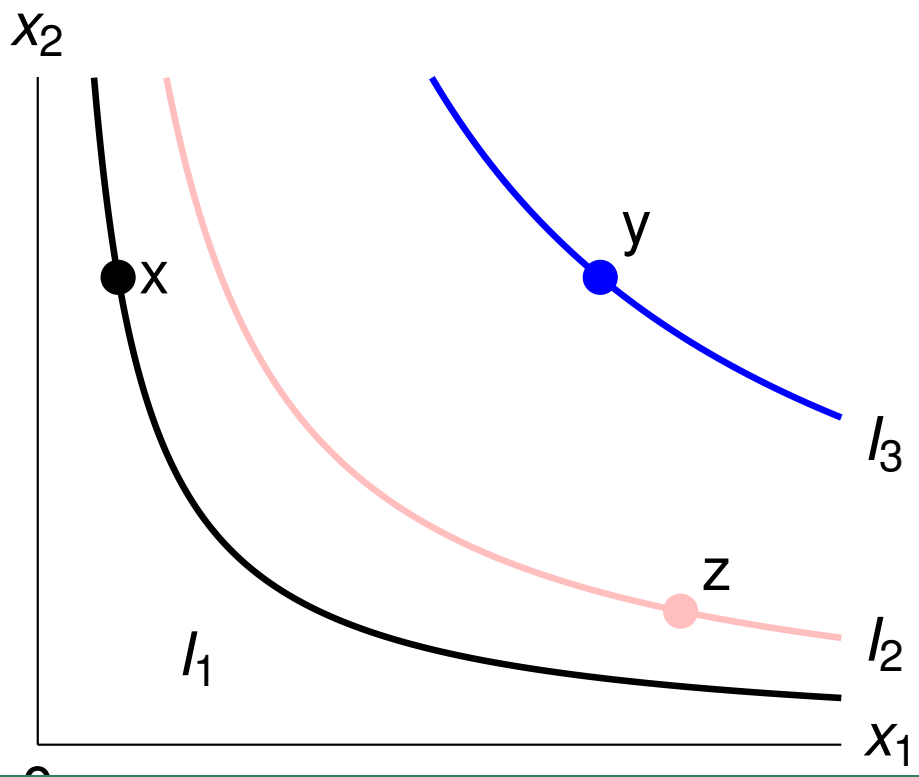
Ranking Bundles

- Now suppose I add indifference curves to this graph.
- How would you rank the bundles?



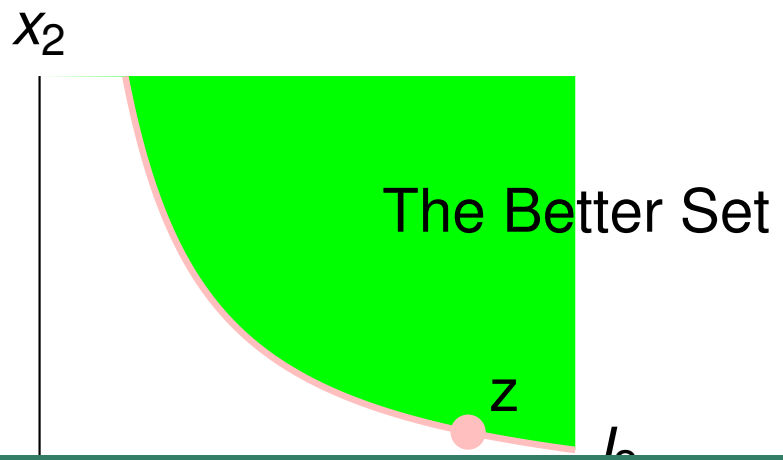
Ranking Bundles

- Since you like both x_1 and x_2, probably more is better than less.
- So the indifference curves higher up and further to the right represent bundles that are more prefferred to bundles on indifference curves closer to the origin.
- Using preference notation, we would say $y \succ z \succ x$.



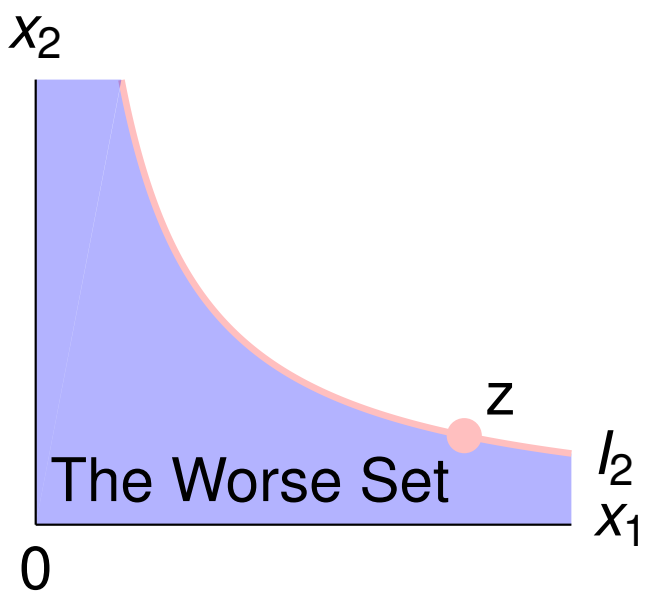
Ranking Bundles: The Better Set

- Let's think just about I_2, or the bundles that this consumer prefers equally to the bundle z.
- Again, if both x_1 and x_2 are goods, all the bundles the consumer **strictly** prefers to z are up and to the right of the indifference curve I_2, which I have shaded in green.
- Note that the bundles the consumer **strictly** prefers to z does NOT include the other bundles on the same indifference curve I_2.
  - The set of all bundles up and to the right of I_2, including the other bundles on I_2 are all the bundles the consumer **weakly** prefers to z.



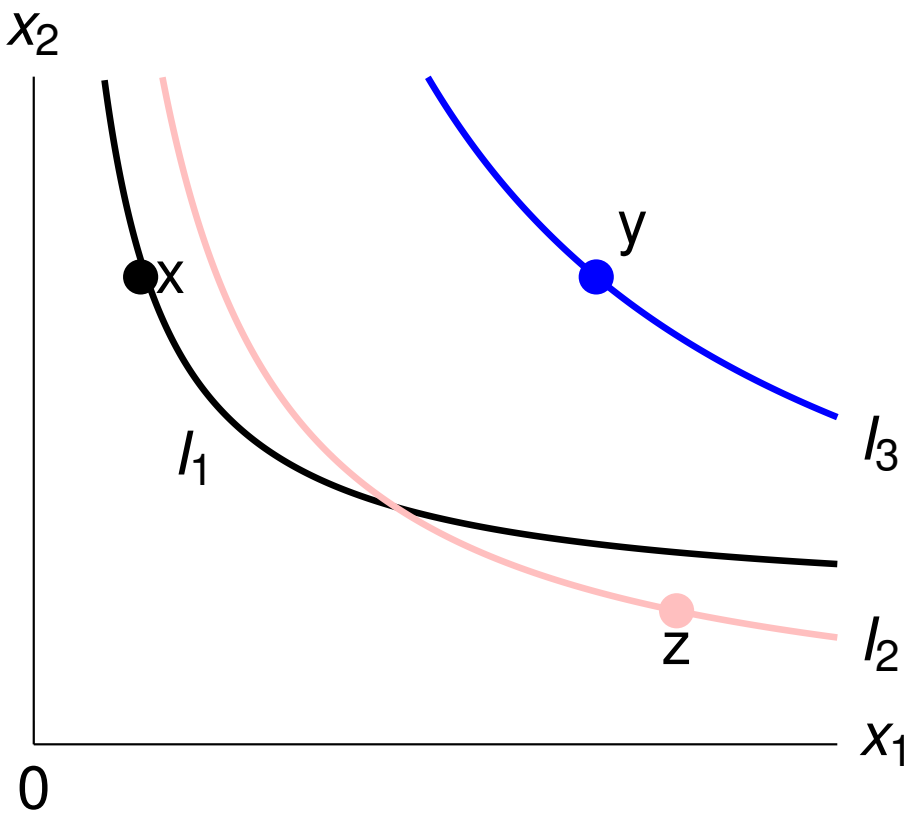
Ranking Bundles: The Worse Set

- Now, if both x_1 and x_2 are goods, all the bundles the consumer **strictly** prefers to z are below and to the left of the indifference curve I_2, which I have shaded in blue.
- Note that the bundles the consumer **strictly** prefers z to does NOT include the other bundles on the same indifference curve I_2.
  - The set of all bundles below and to the left of I_2, including the other bundles on I_2 are all the bundles the consumer **weakly** prefers z to.



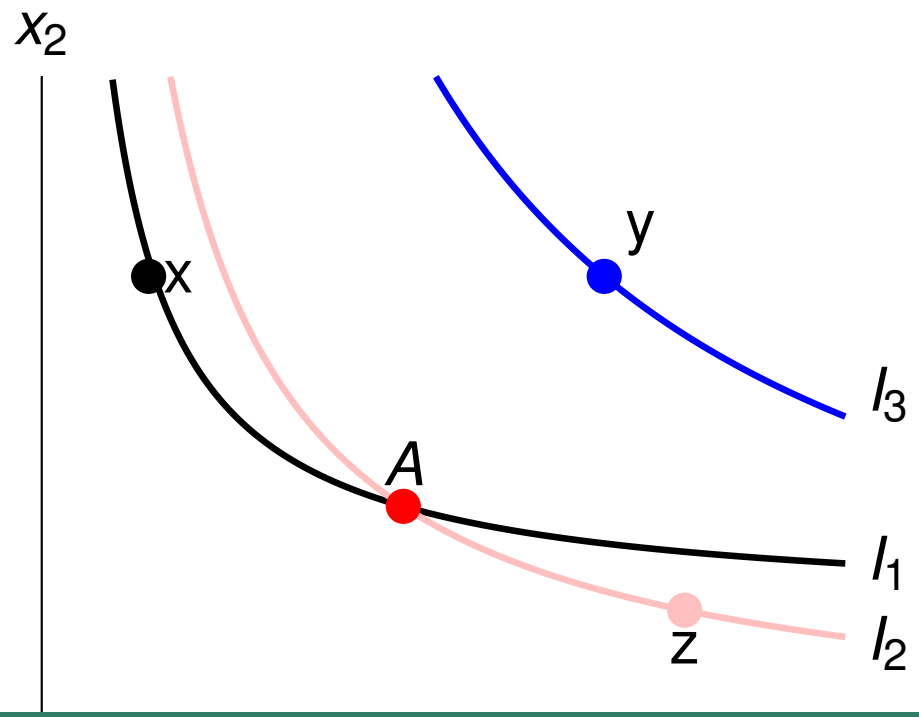
Why Indifference Curves Can't Cross

- Suppose we go back to our original picture.
- But now let's make I_1 and I_2 cross.



Why Indifference Curves Can't Cross

- We said before $z \succ x$.
- But now both I_1 and I_2 contain a point A where they cross.
- And we now have $z \sim A$ and $x \sim A$ based on the indifference curves.
- Which means $z \sim x$ based on transitivity.
- We know it is NOT true $x \sim z$, and the crossing of the indifference curves is the source of the issue.



The Slope of the Indifference Curve

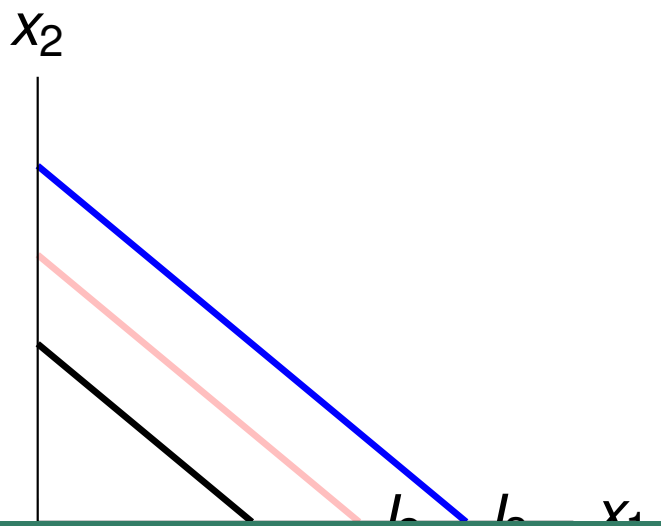
- We know that all bundles along an indifference curve are equally preferred.
- We have also assumed so far that the consumer likes both commodities in any bundle.
  - This is why higher indifference curves are always up and to the right of a given indifference curve.
- **Question**: Why is the indifference curve I_1 in the slide above downward-sloping?
  - If we started at point x, and I took away 1 $x2$, then you would be less well-off since you prefer $x2$ and I took 1 away from you.
  - In order to keep you just as well-off, I could give you some $x1$ to compensate you.
  - Similarly, if I took away 1 $x1$, I could give you some $x2$ to compensate you.
  - This results in a negative slope of the indifference curve!

Special Preferences

- We now know that the shapes of the indifference curves so far have been based on stereotypical preferences – more on that in the next set of slides.
- Meaning the slop changes along the indifference curve, where the consumer is more willing to give up more of the commodity they have relatively more of to get the commodity they have less of.
- But what about non-stereotypical preferences?
  - Suppose Bill is choosing between Sprite and Starry, but Bill only cares about how many citrus sodas he has?
  - Or suppose Bill is buying shoes at a shoe store that sells left shoes and right shoes as two separate products?
- Indifference curves are still valid, they show all the bundles that a consumer equally prefers.
- What would the indifference curves look like for the two types of preferences I described above?

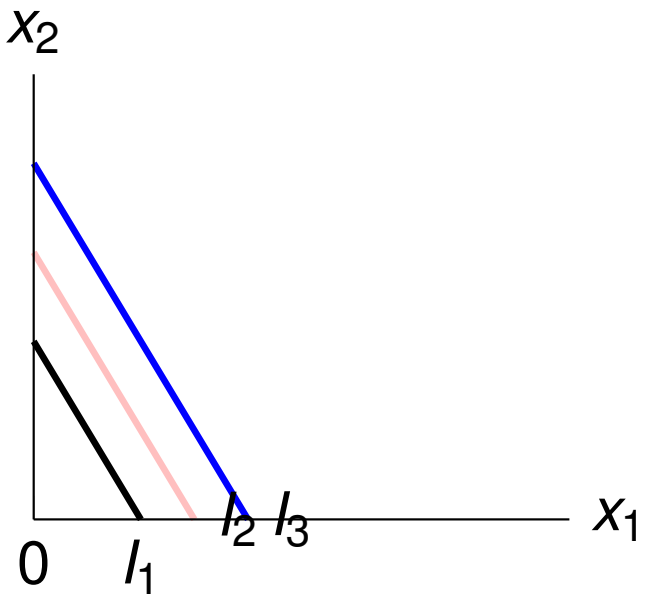
Special Preferences: Perfect Substitutes

- Suppose Bill is choosing between Sprite and Starry, but Bill only cares about how many citrus sodas he has – **We call this: perfect substitutes preferences**.
- Bill is always willing to trade 1 Sprite for 1 Starry, since Bill only cares about the number of Soda's he has.
- Bill's indifference curves would therefore look like straight lines.
  - The slope still represents the tradeoff Bill makes between the two commodities, but the tradeoff never changes and therefore the slope of the indifference curves never change.



Special Preferences: Perfect Substitutes

- The tradeoff does not have to be 1:1.
- I.e. if I am always willing to trade 1 Pepsi for 2 Cokes, then I still have perfect substitutes preferences.
- I just happen to like Pepsi twice as much as I like Coke.
- If I am always willing to trade a x_1's for b x_2's, I have perfect substitute preferences.
- Graphing x_1 on the x axis and x_2 on the y axis, the slope of my indifference curves would be $\frac{-b}{a}$

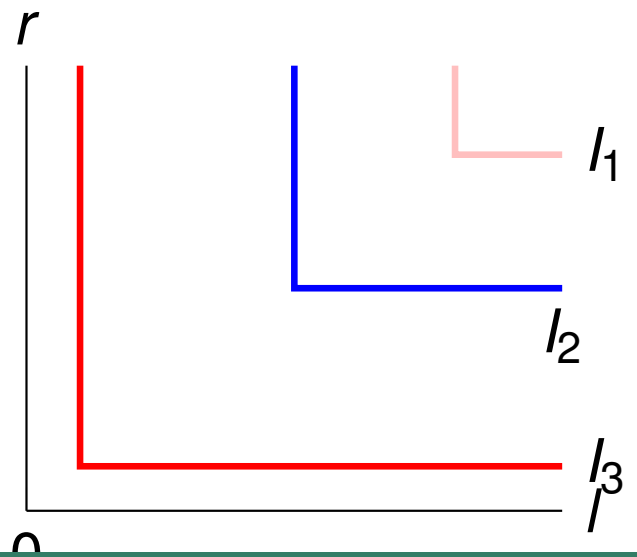


Special Preferences: Perfect Complements

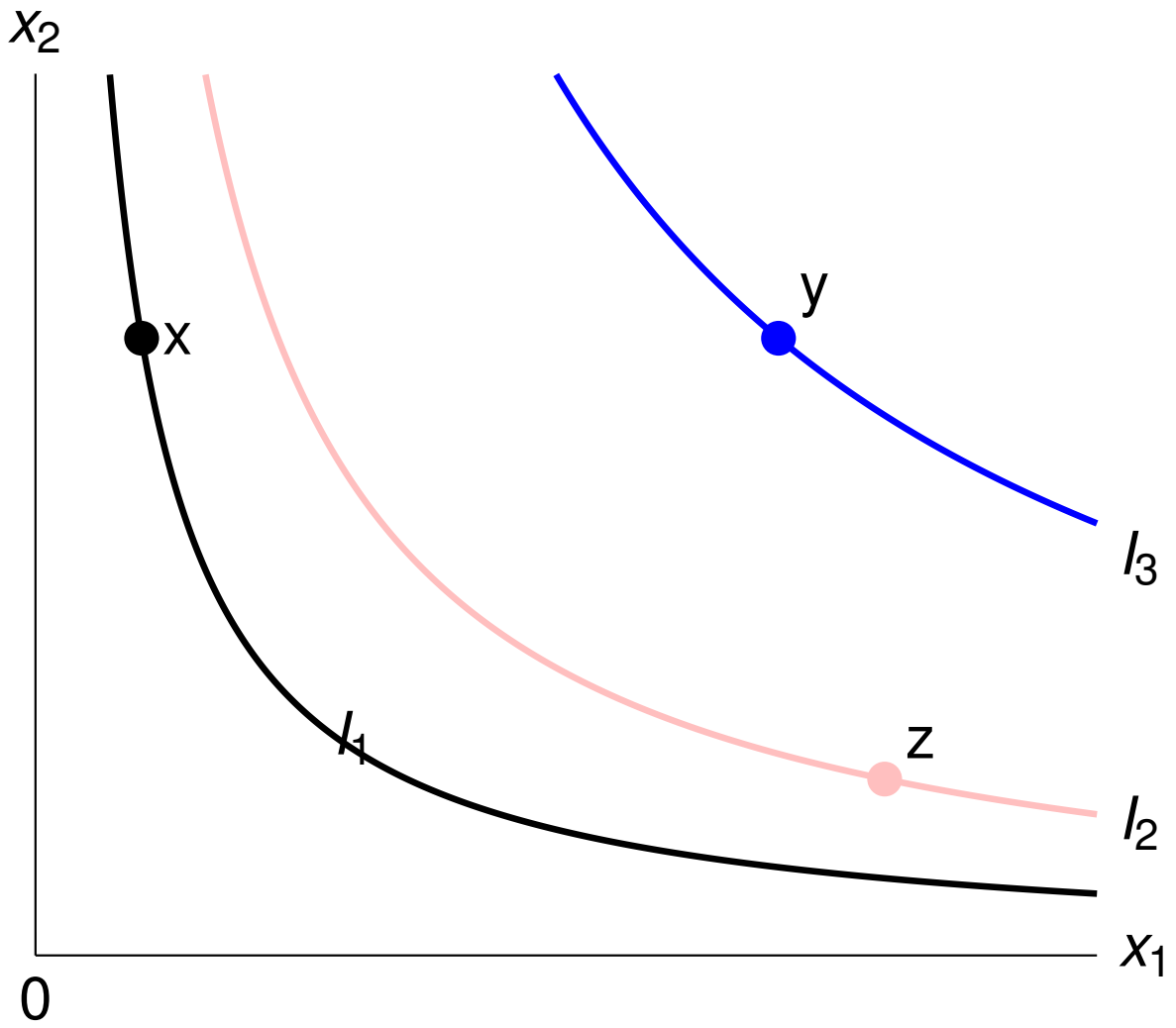
- Suppose you had to buy left shoes *l* and right shoes *r* as two separate goods, rather than buying a pair of shoes.
- You probably would say that your indifference curve would depend on the number of pairs of shoes you have.
- That is if you had the bundle 2 left shoes and 1,000,000 right shoes, you would equally prefer the bundle 2 left shoes and 2 right shoes, and would also equally prefer the bundle 1,000,000 left shoes and 2 right shoes.
- This would be an instance in which you prefer the two goods in fixed proportions – **Perfect Completements preferences**.

Special Preferences: Perfect Complements

- Let's draw the indifference curve for 5 pairs of shoes.
- If you have 5 left shoes l and more than 5 right shoes r, you are on the same indifference curve as if you had 5 right shoes and more than 5 left shoes.
- The indifference curve therefore looks like an "L".
- Any combination that gives me more than 5 pairs of shoes would be on a higher indifference curve, like I_1 in pink.
- Any combination that gives me fewer than 5 pairs of shoes would be on a lower indifference curve, like I_3 in red.



When Do Indifference Curves Look “Typical”



- These “typical” indiferrence curves represt **Well-behaved Preferences**.

Well-behaved Preferences

- Well-behaved preferences have two main characteristics.
  1. Monotonicity – The consumer always prefers more of both commodities.
  2. Convexity – The consumer prefers mixtures (convex-combinations) of both commodities to only having one of the two commodities.