Microeconomic Theory: TA Session

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About this TA Section

Some logistics:

- Fridays, 9:00-9:50am, Hodson 311
- What we'll do: review class material; go over assignments; answer any questions; do practice problems...
- In-section quiz on Friday Feb 13th
- Slides will be made available after each session on Github: https://github.com/pindawang/IntermediateMicro_Spring26 (I'll send a Canvas announcement containing this link)

My office hours:

- In-person: Wednesdays, 4:30-5:30pm, Wyman Park W601A
- Zoom: by appointment
- My email: pwang66@jhu.edu

Properties of preferences

- Completeness: Either $A \succeq B$ or $B \succeq A$
- Transitivity: If $A \succeq B$ and $B \succeq C$, then $A \succeq C$
- Continuity: preferences do not change abruptly for small change in quantities
- Strict monotonicity: "more of anything is strictly preferred"
- Monotonicity: "more of everything is strictly preferred"
- Nonsatiation: For every bundle, there's always a better one
- Convexity: "consumer tends to prefer balanced bundles over extreme ones"

See lecture slides for technical definitions

These are *possible* properties that preferences *can* have; we're not saying all preferences must have these properties

Utility functions

A **utility function** is a mathematical representation of preferences

- Utility function exists when preferences are complete, transitive, and continuous

For now, we only care about rankings ("ordinality"), not the exact utility number ("cardinality")

Transformations of utility functions

Strictly increasing transformations preserve utility rankings

- Suppose $u(x, y)$ is a utility function, and $f(u)$ is a strictly increasing function, then the utility function $v(x, y) = f(u(x, y))$ represents the same preferences as $u(x, y)$

Examples of strictly increasing $f(u)$:

- Linear transformations: $f(u) = 3u - 5$
- Exponential transformations: $f(u) = 2u^2$ (assuming utilities are non-negative)
- Log transformations: $f(u) = \log u$

Transformations of utility functions

Consider the following two utility functions:

1. $u = 4x + 2y$
2. $v = 4x^2 + y^2 + 4xy + 2x + y$

Do they represent the same preferences?

Answer: Yes, because $v = \frac{1}{4}(4x + 2y)^2 + \frac{1}{2}(4x + 2y)$; it's a strictly increasing transformation of u.

Transformations of utility functions

Consider the following two utility functions:

1. $u = x + y$
2. $v = (x + y)^2 + 3x$

Do they represent the same preferences?

Answer: No, because it's not a transformation of u. The rankings of (4,0) and (0,5) are different with these two utility functions. $v = (x + y)^2 + 3(x + y)$ would have been a strictly increasing transformation of u, but $v = (x + y)^2 + 3x$ is not.

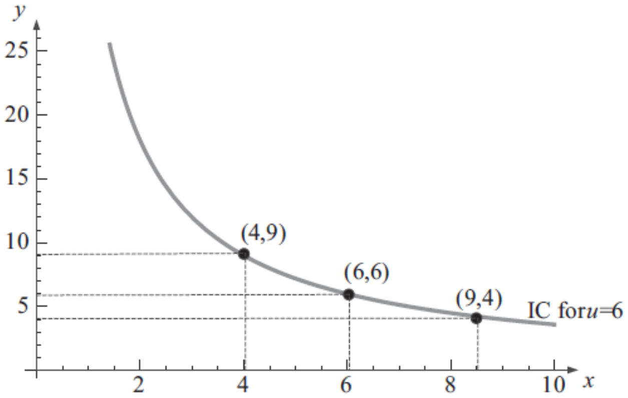
Utility functions

Suppose preferences are represented by $u(x, y) = \min\{x, y\}$.

1. Are preferences strictly monotonic?
2. Are preferences monotonic?

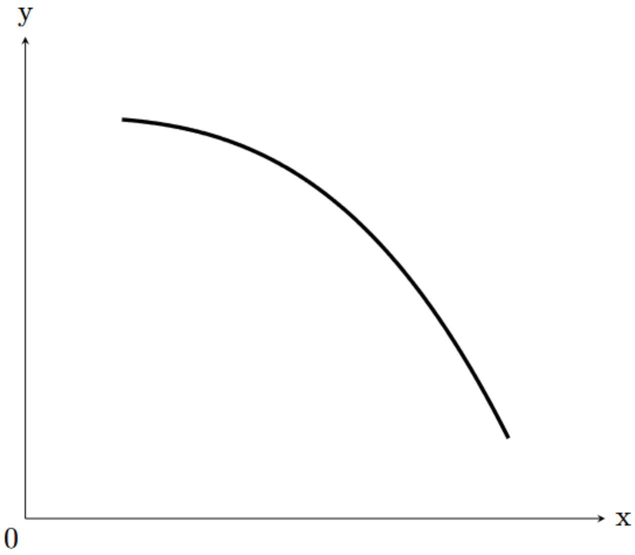
Answer: (1) No. (2) Yes.

Indifference curves



Indifference curves

Typical indifference curves are convex. What does an indifference curve that is not convex look like?



Indifference curves

Why can't a typical indifference curve be thick? Which property of preferences does it violate?

Answer: If an indifference curve is thick, then there exist bundles (x_1, y_1) and (x_2, y_2) such that $x_1 > x_2$ and $y_1 > y_2$ but $(x_1, y_1) \sim (x_2, y_2)$. This violates monotonicity.

Reminder

Homework 1 is due on Wednesday, Jan 28th