Utility

Econ 50 | Lecture 5 | January 19, 2013

Lecture

- Quantifying Utility
- MRS, with Math
- Five New-ish Friends

Group Work

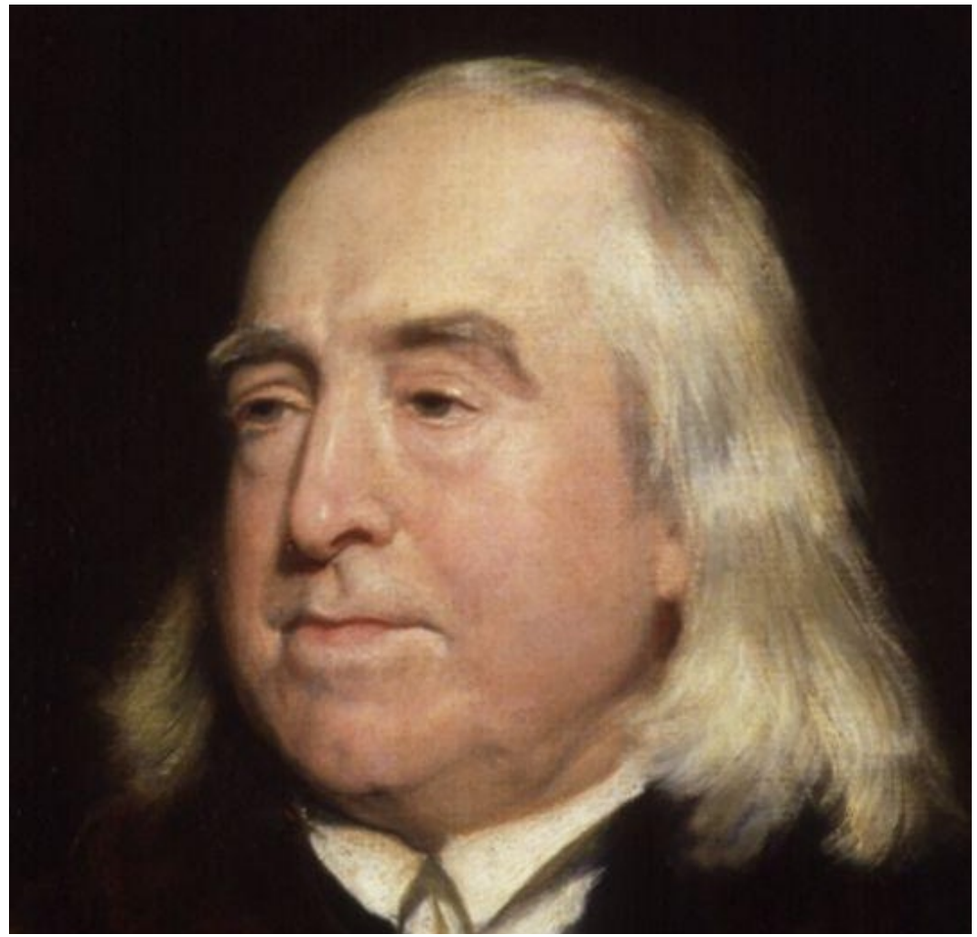
- Deep dive into three utility functions

Part I: Quantifying Utility

18th/19th Centuries: Utilitarianism

"...the **greatest happiness of the greatest number** is the foundation of morals and legislation…"

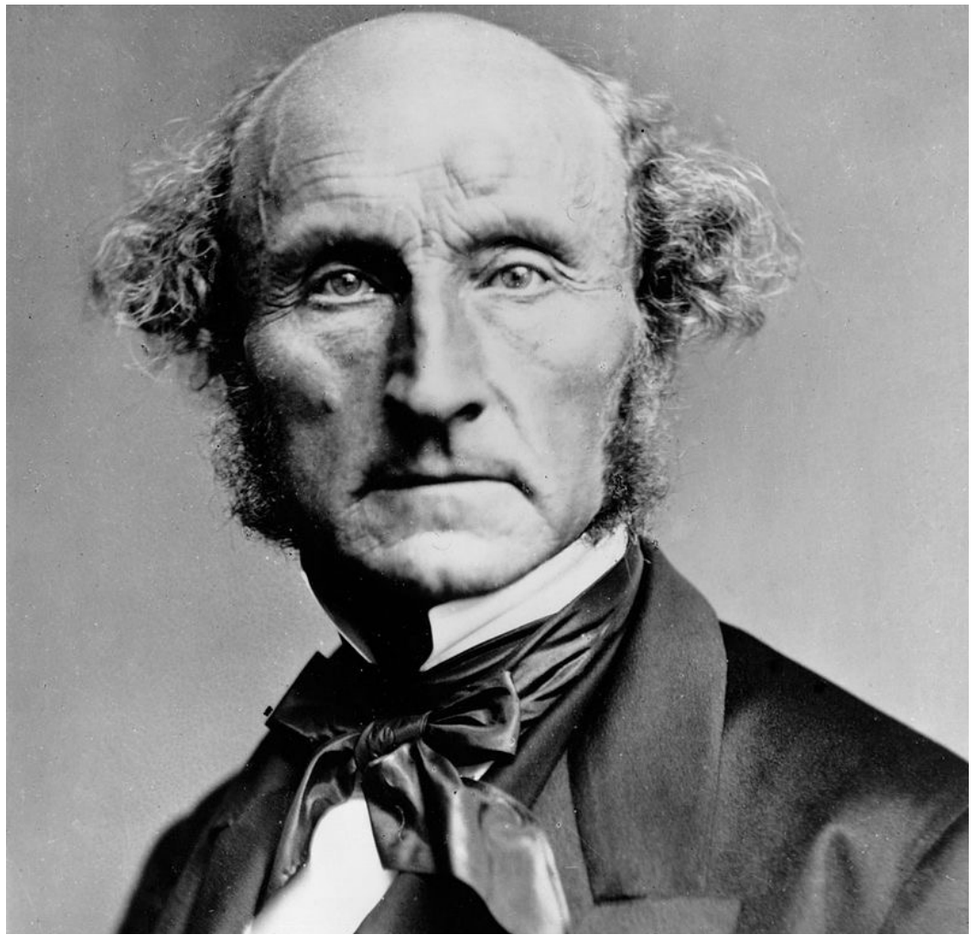
— Jeremy Bentham



18th/19th Centuries: Utilitarianism

"the utilitarian standard... is **not the agent's own greatest happiness**, but the **greatest amount of happiness, altogether**."

— John Stuart Mill



20th Century: Revealed Preference

"**Desires cannot be measured directly**, but only indirectly, by the outward phenomena to which they give rise...

the measure is found in the **price which a person is willing to pay** for the fulfilment or satisfaction of his desire."

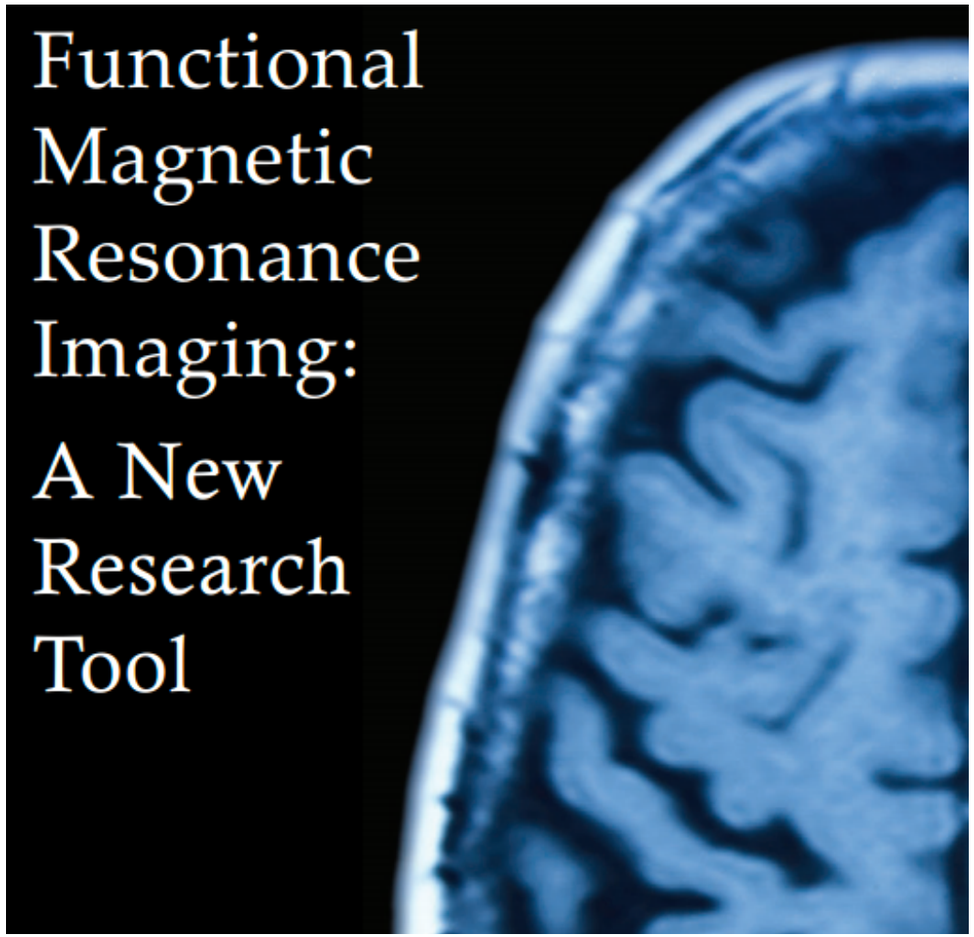
— Paul Samuelson

21st Century: Neuroeconomics

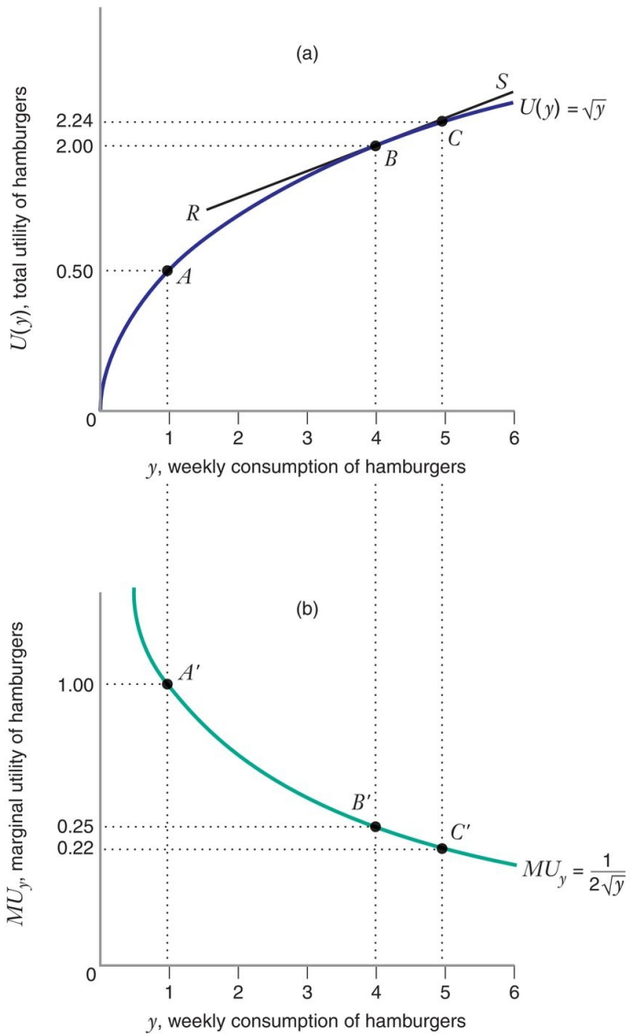
"When study participants sipped soda without knowing which it was, **[Coke and Pepsi] prompted equal reactions in the area of the brain associated with satisfaction**.

When participants knew which brand they were drinking, **Coke suddenly tasted better**."

— American Psychological Association Science Directorate, 2007



Utility Functions



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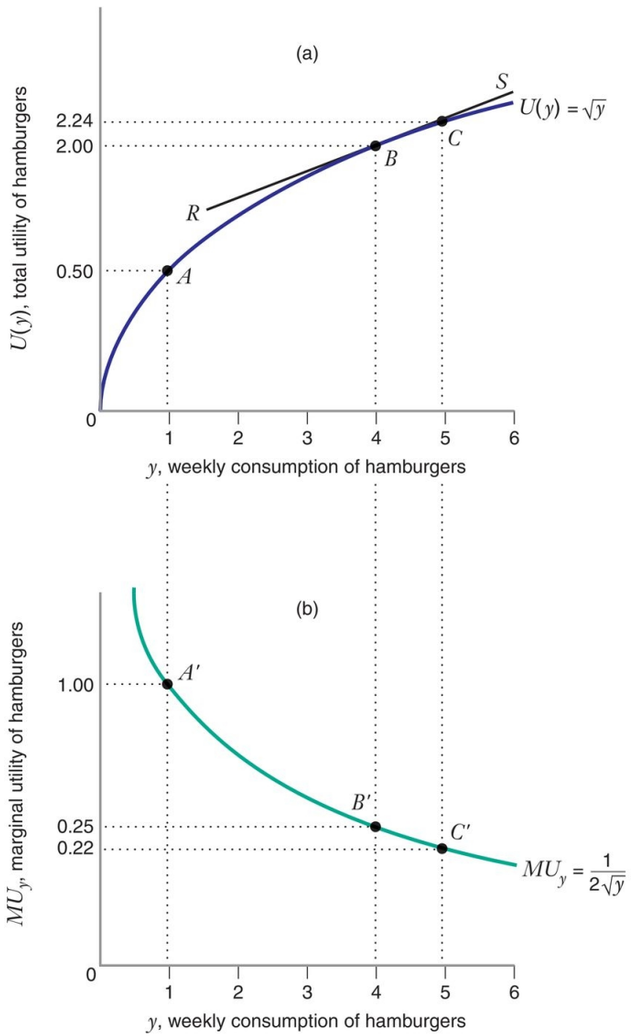

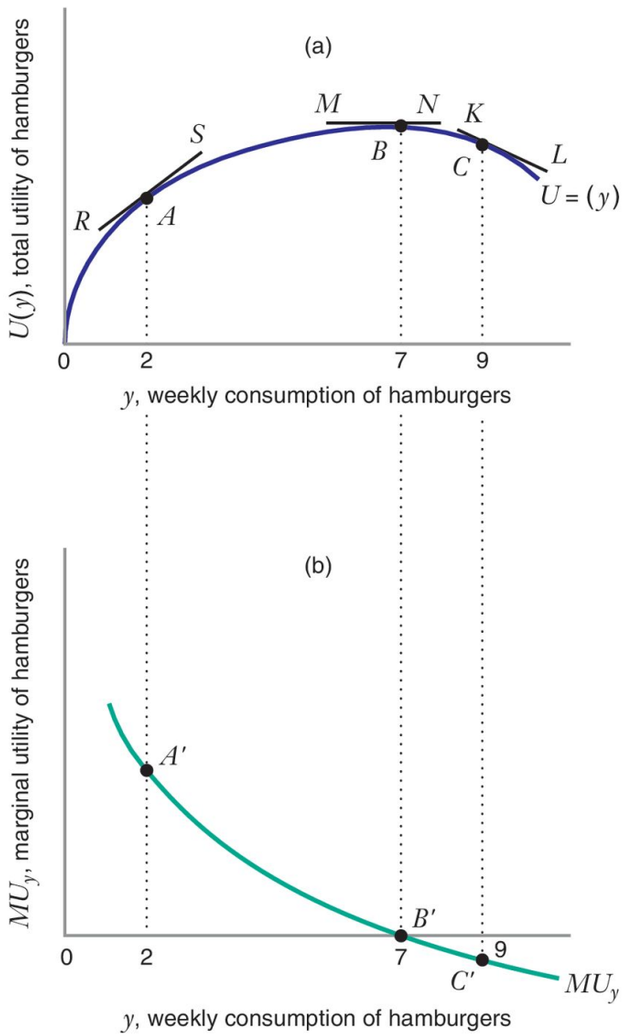

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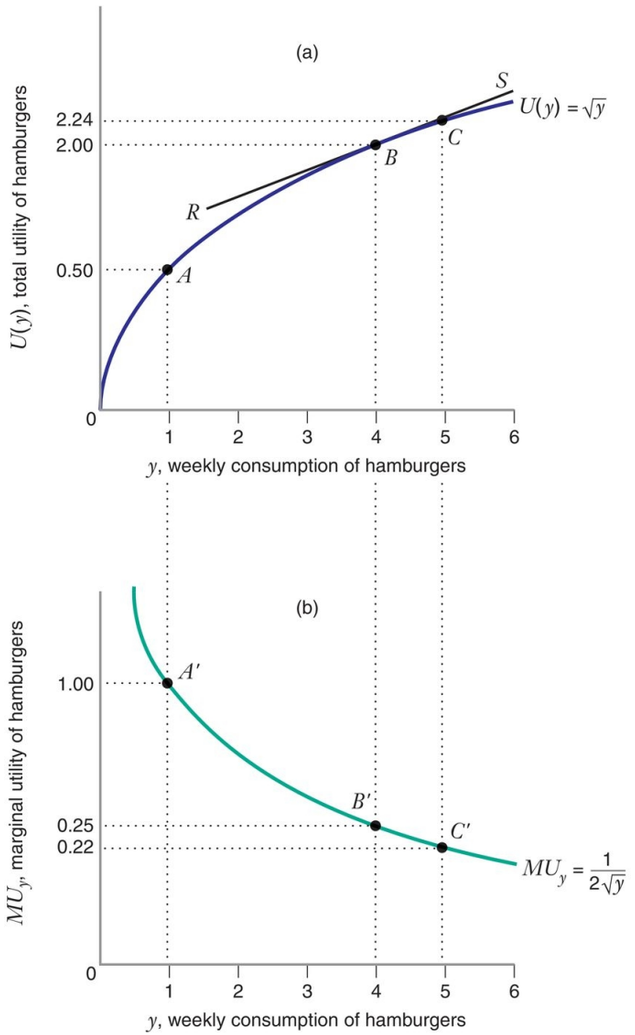
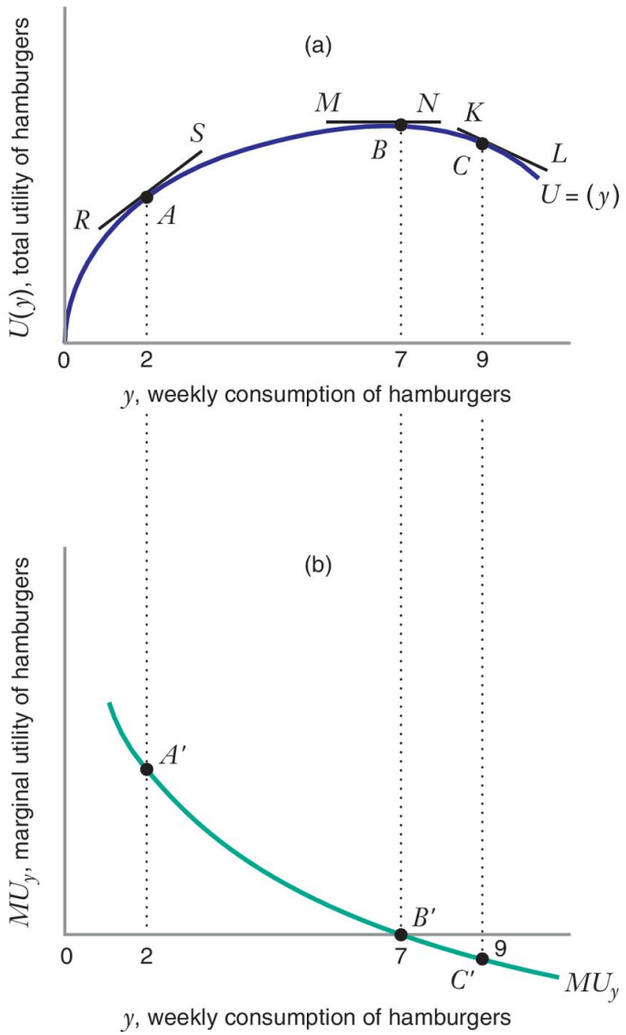
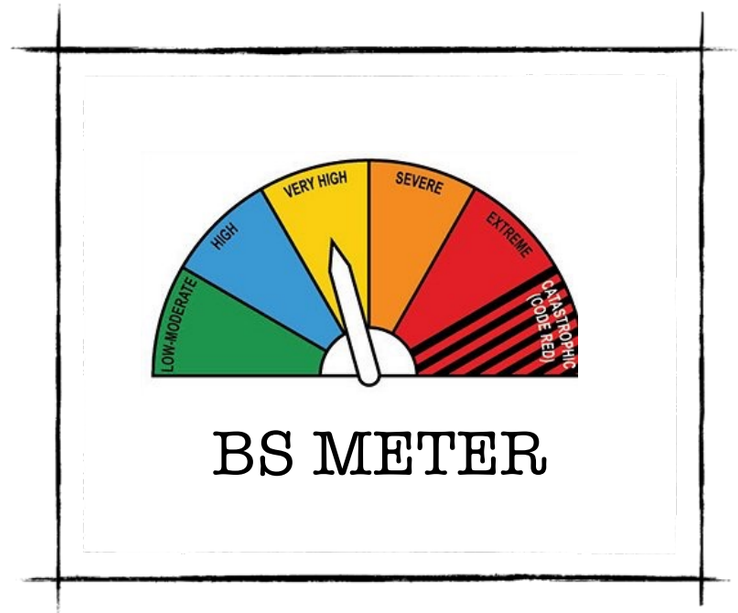
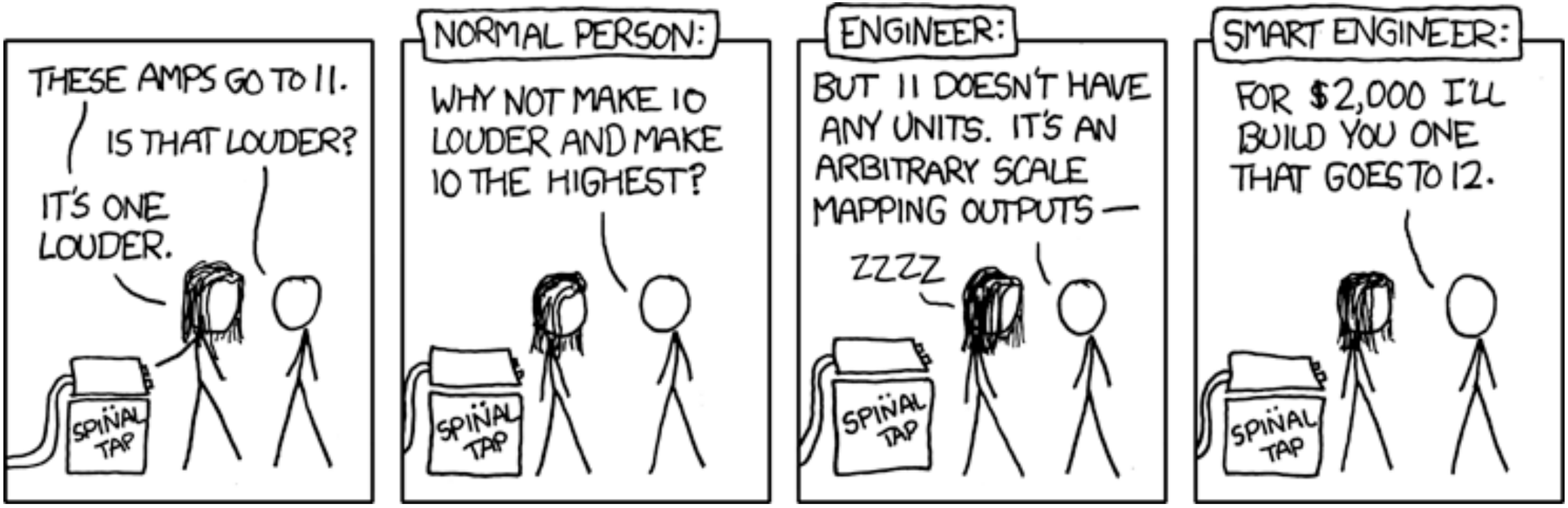






Why?

https://youtu.be/KOO5S4vxi0o



http://xkcd.com/670/

Cardinality:
Numbers are important.

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Ordinality:
Ranking is important.

Recall: Completeness and Transitivity

- **Completeness**: any two bundles can be compared.
- **Transitivity**: if A is preferred to B, and B is preferred to C, then A is preferred to C.
- Group work: “is at least as tall as” is **complete** and **transitive**.
- Why? **Numerical comparison is complete and transitive.**

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Utility Functions That Aren't Silly

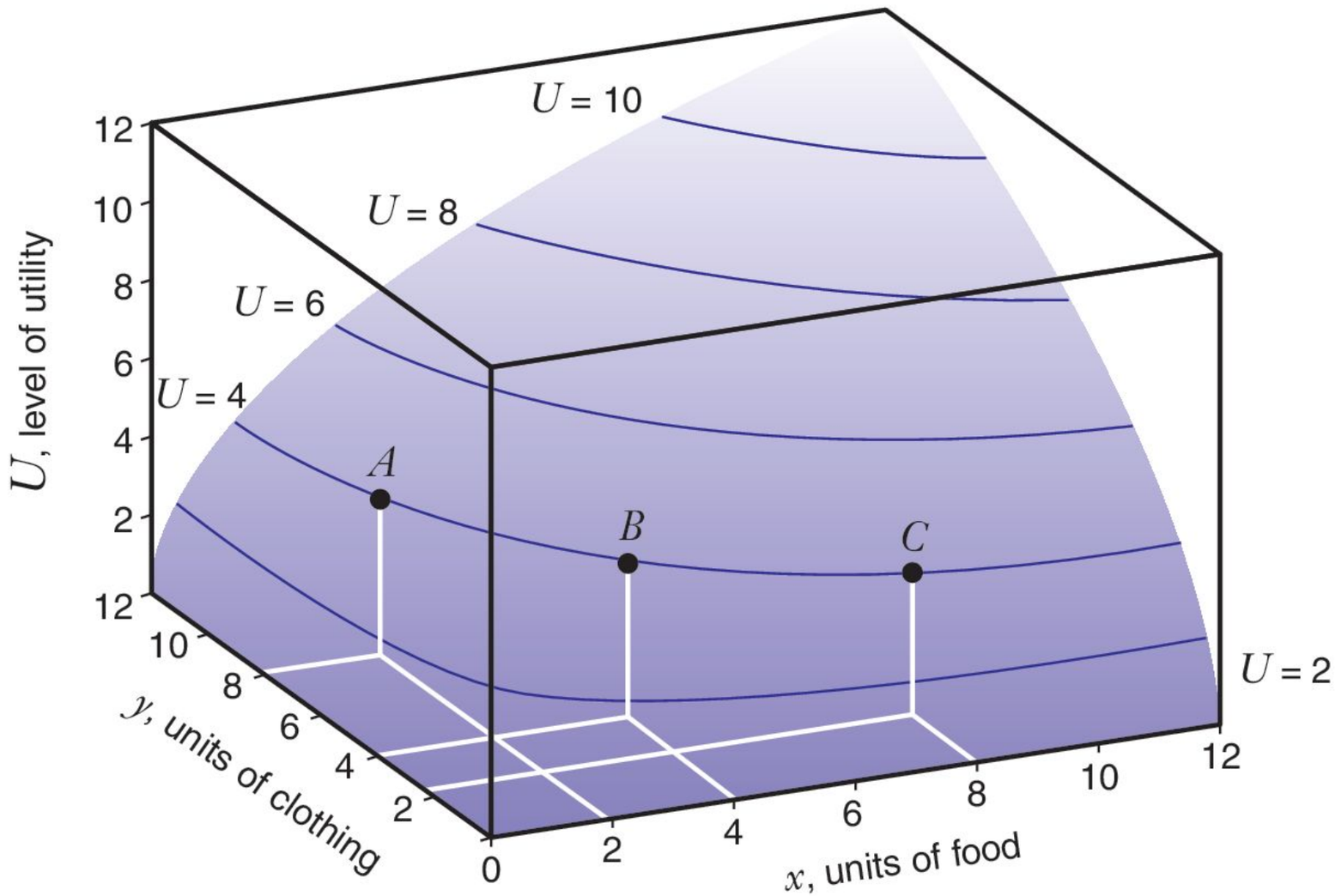
- A utility function **u()** assigns a real number to every possible bundle.

$$A \succ B \text{ if and only if } u(A) > u(B).$$

$$A \sim B \text{ if and only if } u(A) = u(B).$$

$$A \prec B \text{ if and only if } u(A) < u(B).$$

Indifference Curves are Level Curves of u(x,y)



Marginal Utilities
are the partial derivatives of u().

Silly on their own
Meaningful in generating MRS

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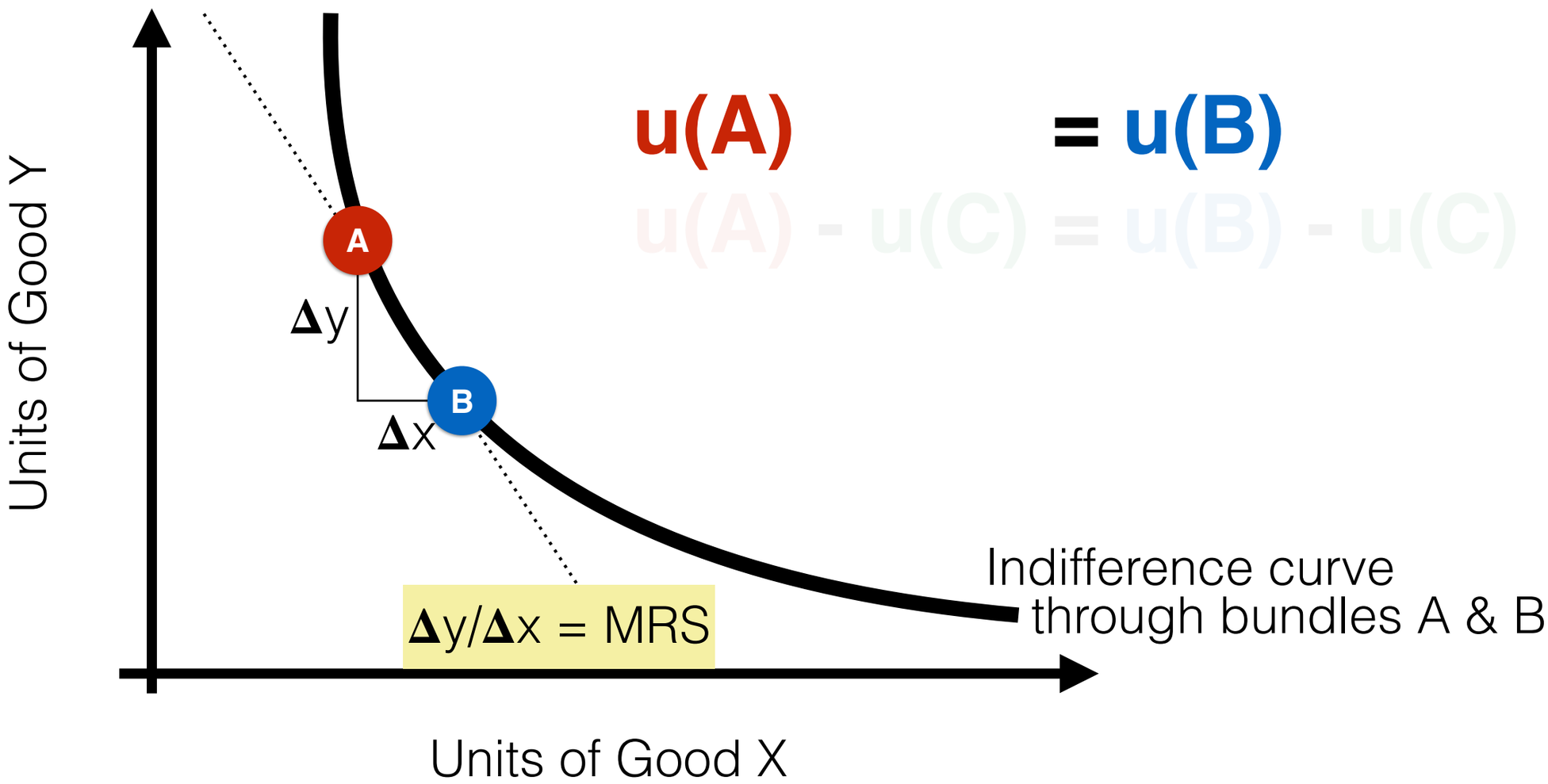
Meaningful in generating **MRS**

Part II: MRS, with Math

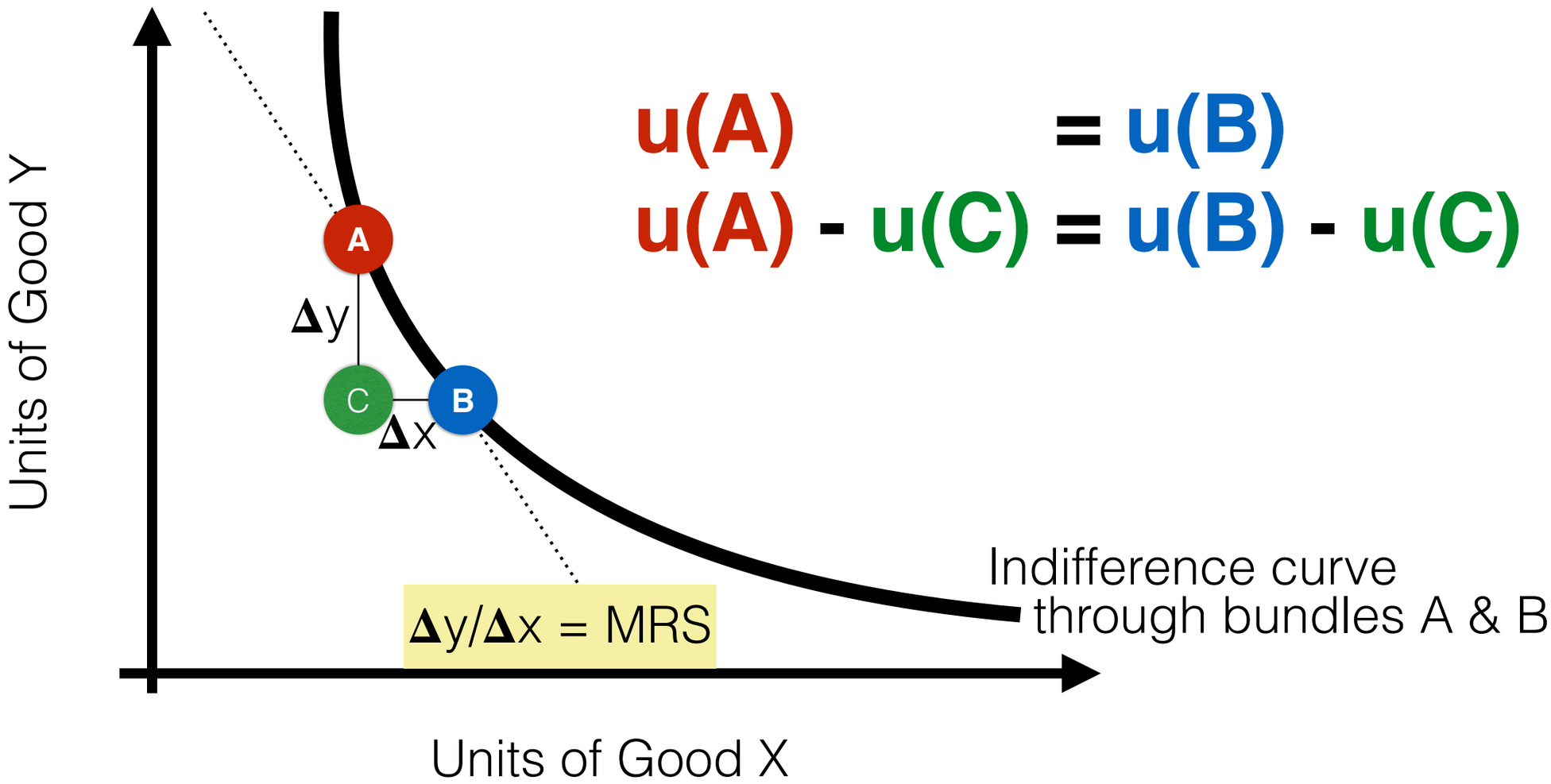
Marginal Rate of Substitution

- **Intuitively**: rate at which a consumer is willing to give up good Y to get an additional unit of good X.
- **Visually**: absolute value of the slope of an indifference curve
- **Mathematically**: $\frac{MU_x}{MU_y}$

Marginal Rate of Substitution



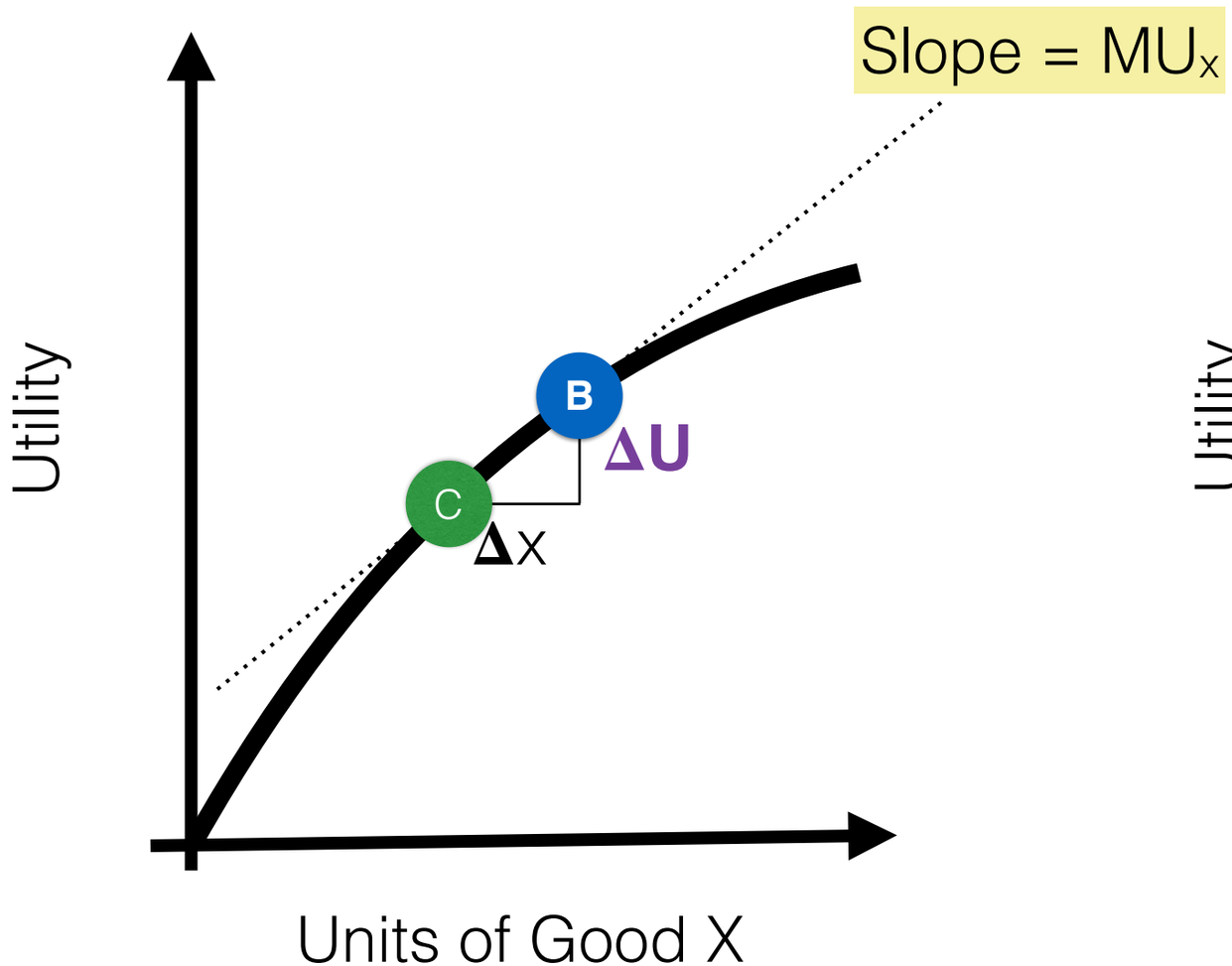
Marginal Rate of Substitution

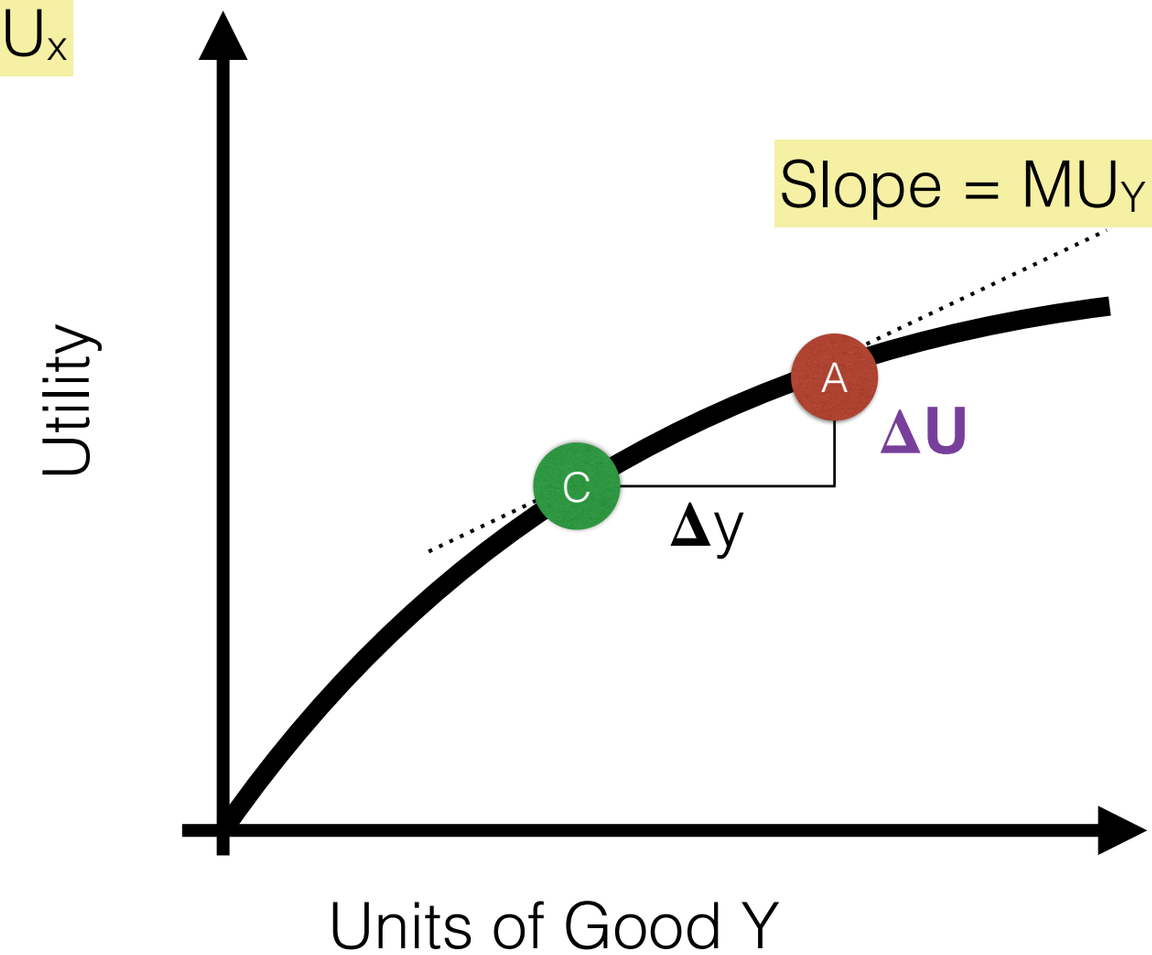


u(A) = u(B)

u(A) - u(C) = u(B) - u(C)

Partial Derivatives





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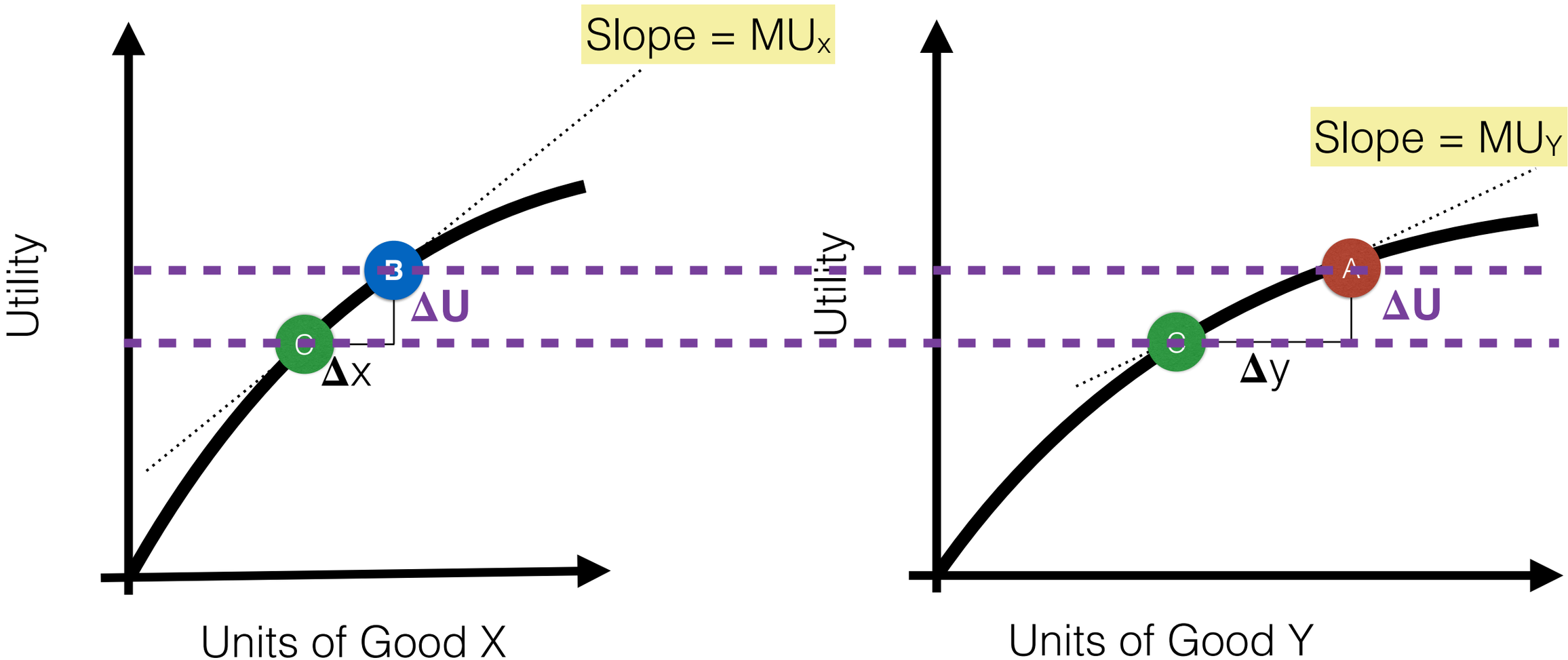

Solving for MRS

A Special Case: “Composite Good”

Part III: Five New-Ish Friends

Utility Function 1: Cobb-Douglas

Utility Function 2: Perfect Substitutes

Utility Function 3: Perfect Complements

Utility Function 4: CES

Utility Function 5: Quasilinear