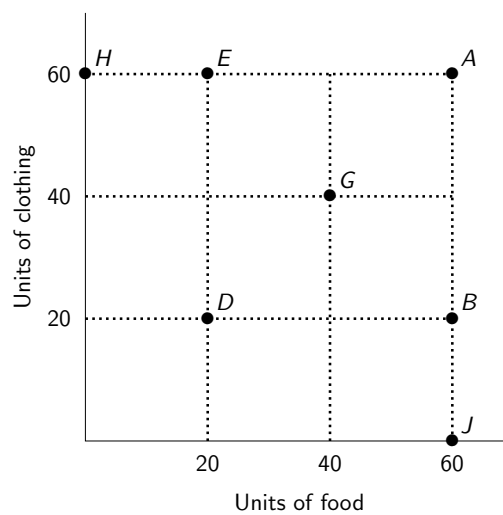


## Agenda

1. Where Are We?
2. Consumer Preferences
3. Utility Functions
  - ▶ Marginal Utility
  - ▶ Indifference Curves
  - ▶ Marginal Rate of Substitution
4. Special Utility Curves

## Basket of Goods

- ▶ **Good** -
- ▶ **Basket** -



- ▶ **Preferences** -

## Assumptions on Preferences

- ▶ Three important assumptions that we will make on consumer preferences over goods.
  - ▶ **Preferences are Complete** -
  - ▶ **Preferences are Transitive** -
  - ▶ **More is better** -

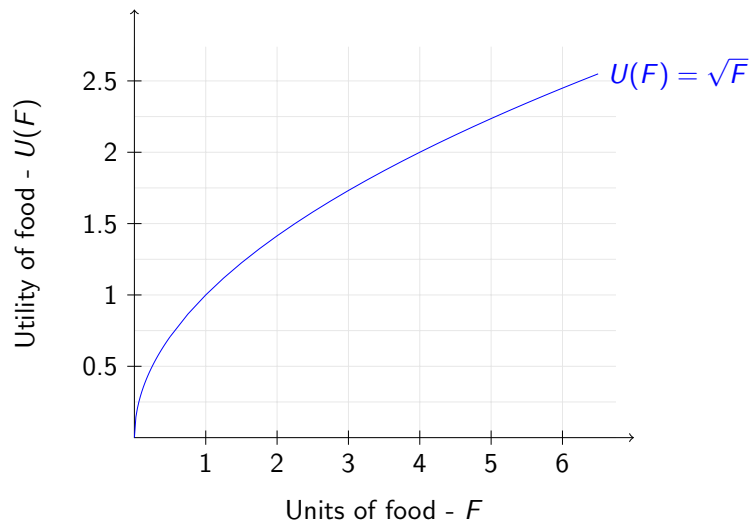
## Ordinal vs. Cardinal Ranking

- ▶ **Ordinal Ranking** - Ranking that indicates whether a consumer prefers one basket to another, but does not contain  
\_\_\_\_\_
- ▶ **Cardinal Ranking** - A \_\_\_\_\_ of the intensity of preference for one basket over another.
- ▶ \_\_\_\_\_ can be inferred from \_\_\_\_\_, but not vice-versa.

## Utility Functions

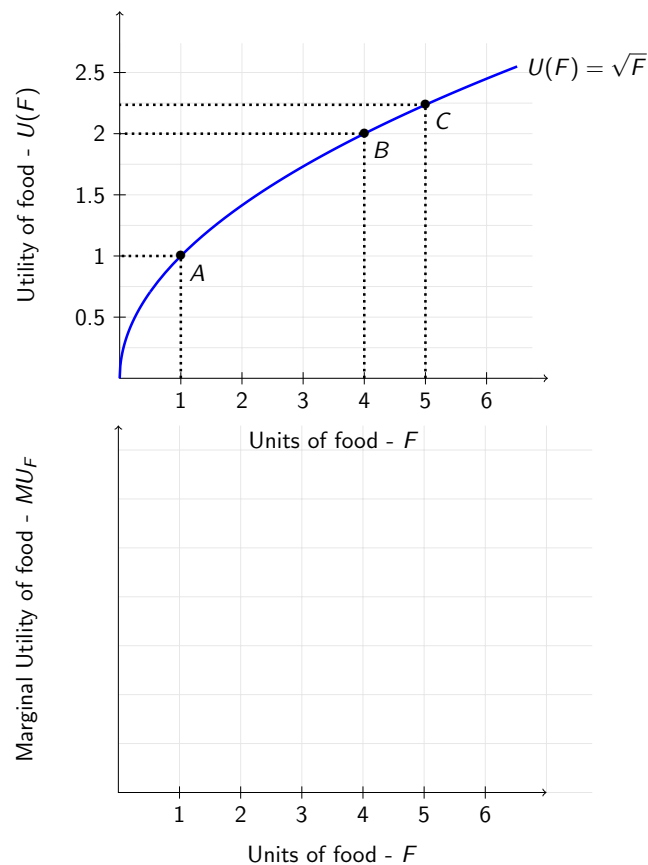
- ▶ If the 3 assumptions are satisfied, then we can represent preferences with utility functions.

### Definition (Utility function)



## Marginal Utility

- ▶ **Marginal Utility -**



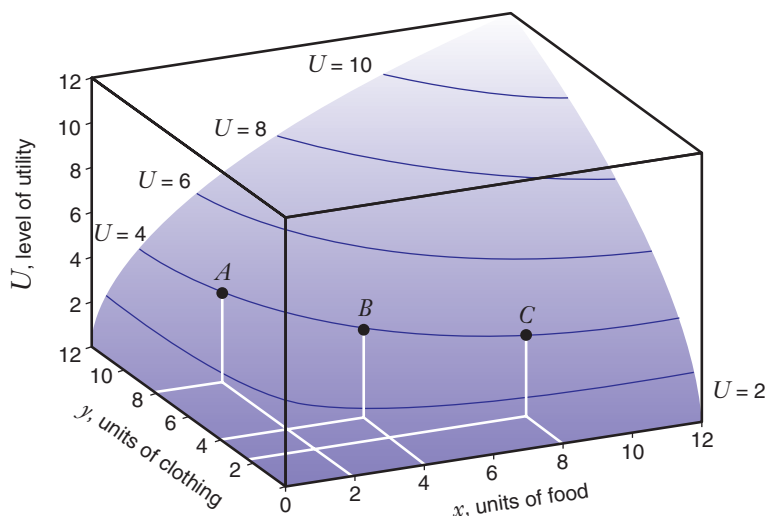
- ▶ **Principle of diminishing marginal utility -**

## Multiple Goods

- ▶ Marginal Utility at basket  $(x, y)$ ,

$$MU_x(x, y) =$$

$$MU_y(x, y) =$$



- ▶ Example:  $U(x, y) = 3xy^2 + x^2$

## Exercise

- ▶ Suppose  $U(x, y) = \sqrt{xy}$ , calculate the Marginal utility with regard to  $x$  and  $y$  at the following points,
- ▶ Do we see diminishing marginal utility?

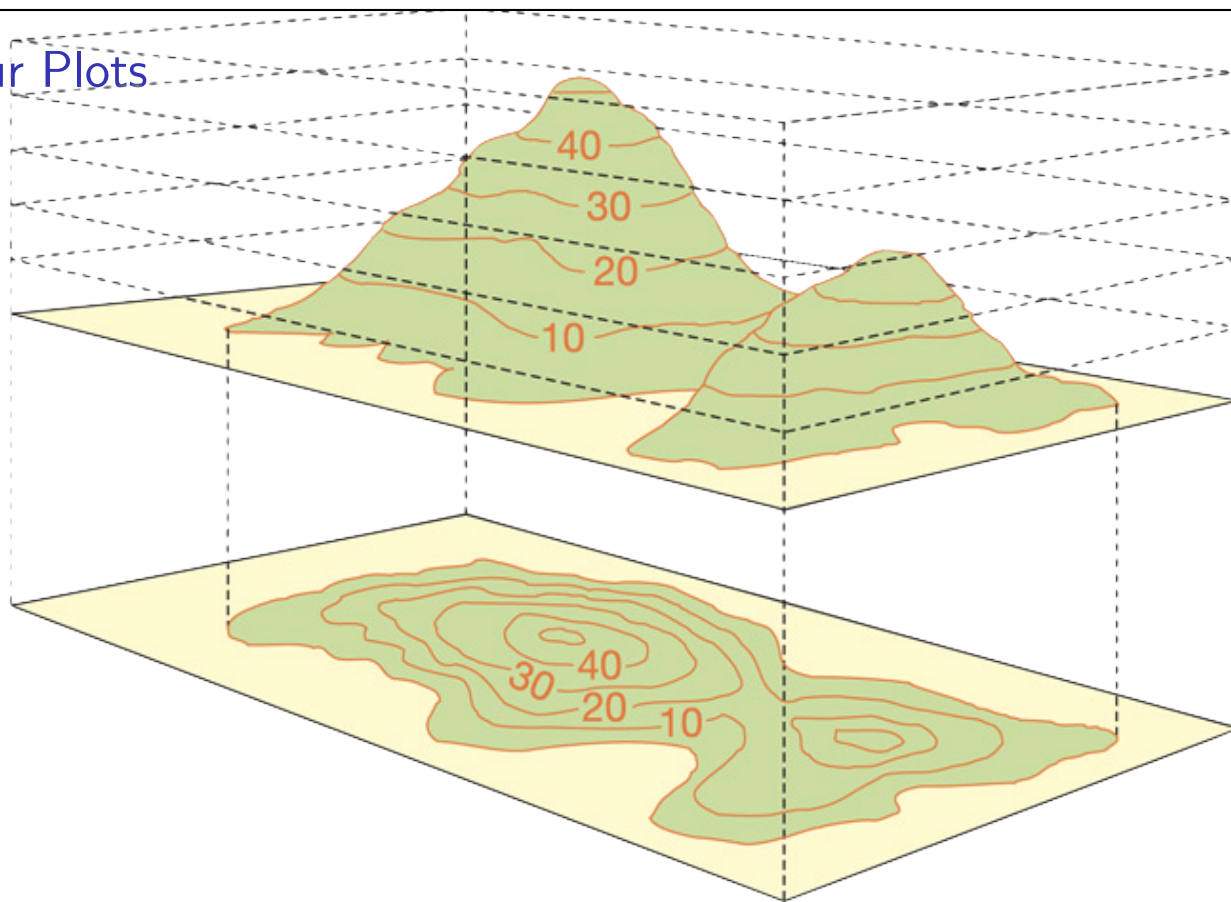
	(4, 1)	(4, 4)	(1, 4)
$MU_x$			
$MU_y$			

## Exercise

► Method #1:

► Method #2:

## Contour Plots

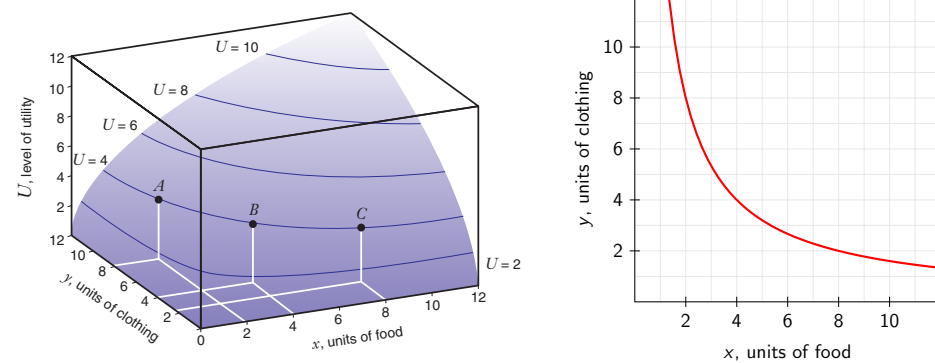


## Indifference Curves

### Definition (Indifference Curve)

A curve connecting a set of \_\_\_\_\_

- ▶ Indifference Curves for  $U(x, y) = \sqrt{xy}$

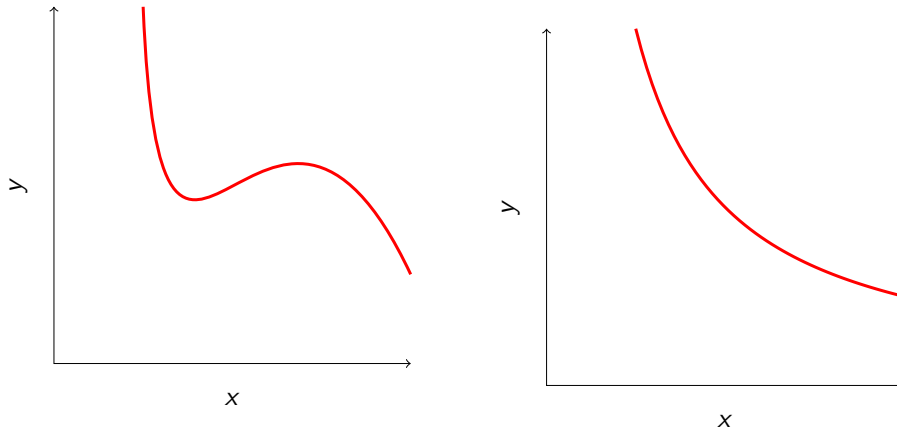


## Properties of indifference Curves

- ▶ If preferences satisfy the three assumptions, then indifference curves satisfy the following:
  1. If consumer likes both goods, indifference curves have \_\_\_\_\_ slope.
  2. Indifference curves cannot \_\_\_\_\_.
  3. Every consumption basket lies on \_\_\_\_\_
  4. Indifference curves are not \_\_\_\_\_.

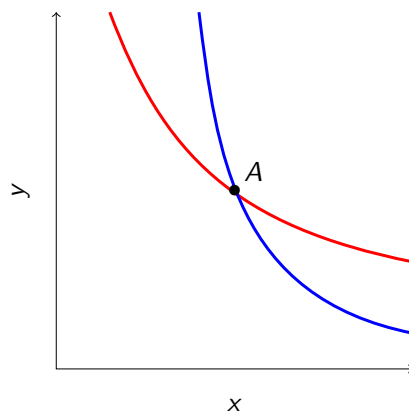
## Property #1

- ▶ **Property #1:** If consumer likes both goods, indifference curves have negative slope.



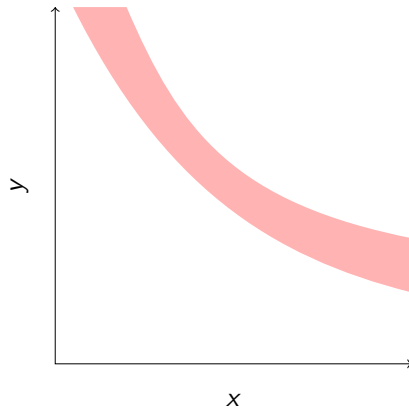
## Property #2 and #3

- ▶ **Property #2:** Indifference curves cannot intersect.
- ▶ **Property #3:** Every Basket lies on only one indifference curve.



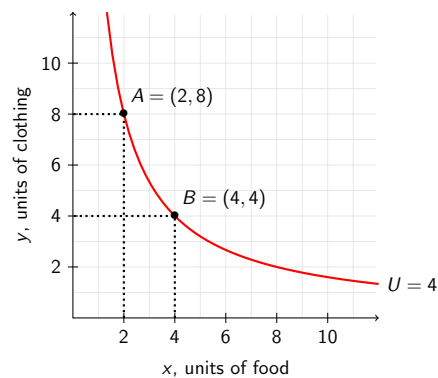
## Property #4

- ▶ **Property #4:** Indifference curves are not “thick”.



## Marginal Rate of Substitution

### Definition (Marginal Rate of Substitution)





## Marginal Rate of Substitution

- ▶ The change in utility from  $(x, y)$  to  $(x', y')$  can be written as,

$$\Delta U \approx$$

- ▶ To move along IC, utility must be \_\_\_\_\_.
- ▶ Rearranging,
- ▶ So  $MRS_{x,y}$  is the \_\_\_\_\_ of IC at point  $(x, y)$ .

## Diminishing Marginal Rate of Substitution

- ▶ **Diminishing Marginal Rate of Substitution** - A feature of consumer preferences for which the marginal rate of substitution of one good for another good

\_\_\_\_\_

\_\_\_\_\_

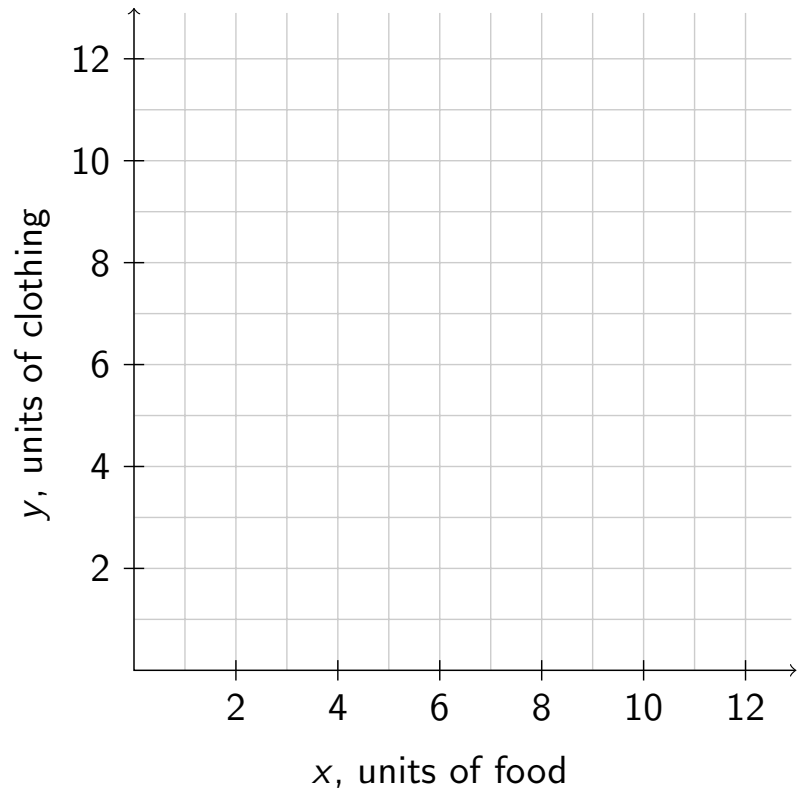
- ▶ Example:

Unit of Clothing	Units of Food	$MRS_{x,y}$

- ▶ If you have 16 units of clothing and 1 unit of food,

## Exercise

- ▶ For  $U(x, y)$ , plot the indifference curve,  $U(x, y) = 12$ .
- ▶ Calculate the  $MRS_{x,y}$  at  $x$  values 1,3,6,12 on  $U(x, y) = 12$ .
- ▶ Does  $U(x, y)$  exhibit diminishing  $MRS_{x,y}$ ?



## Exercise

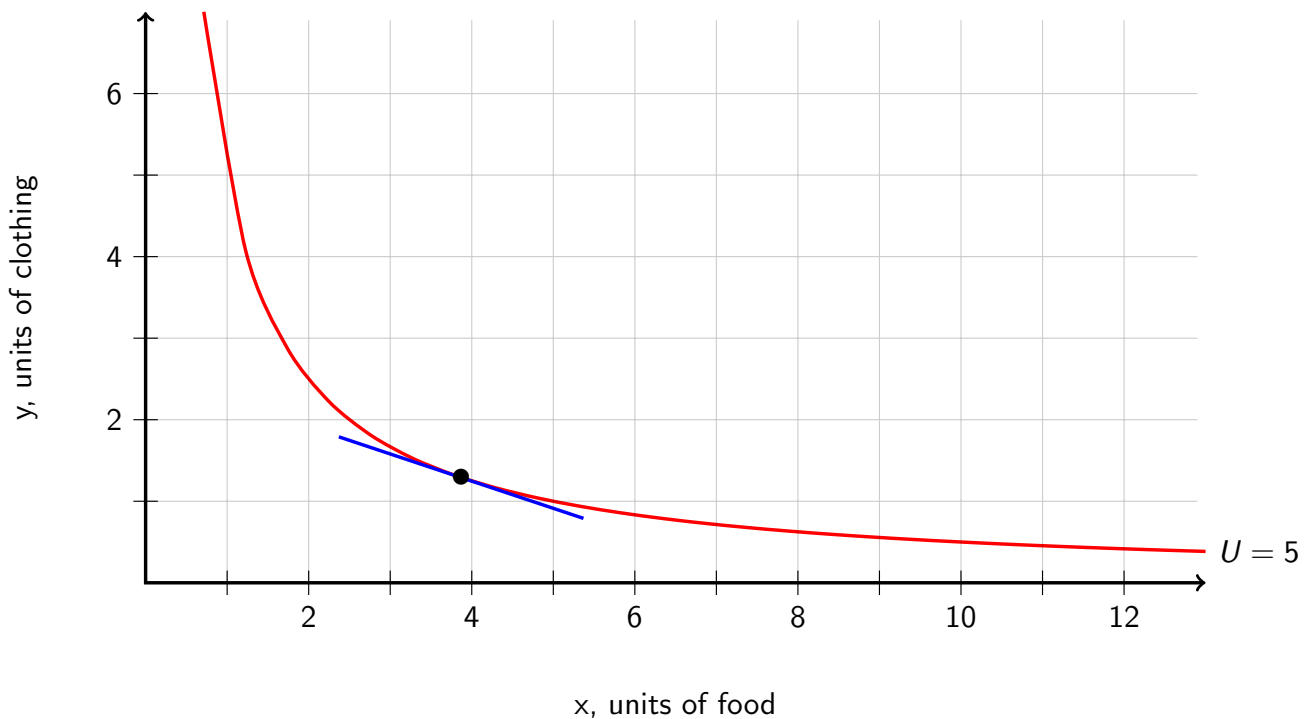
▶ **Method #1:**

▶ **Method #2:**

## Example

- ▶ Let  $U(x, y) = xy$
- ▶ For each utility level,  $U = \{5, 10, 15, 20, \dots, 45\}$ , find a point on the indifference curve where the MRS is  $\frac{1}{3}$ .
- ▶ On the  $U = 5$  indifference curve,  $xy = 5$ ,

## Example

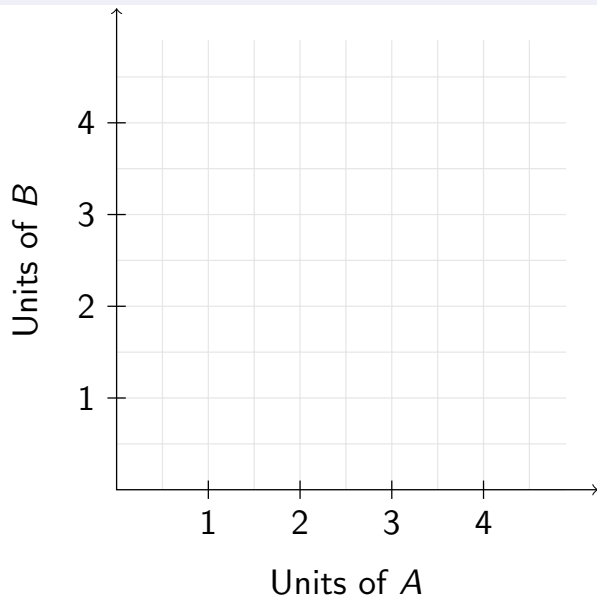


- ▶ For this utility function, whenever \_\_\_\_\_ .

## Perfect Substitutes

### Definition (Perfect Substitutes)

Two goods such that the marginal rate of substitution of one good for the other is

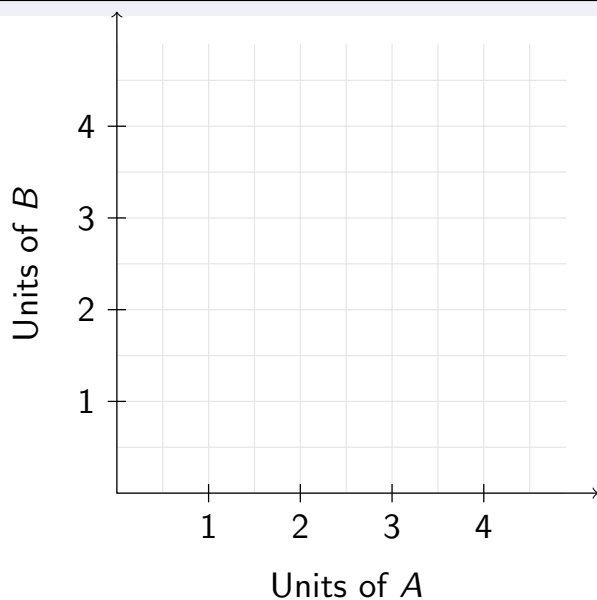


► Examples:

## Perfect Complements

### Definition (Perfect Complements)

Two goods that the consumer always wants to consume

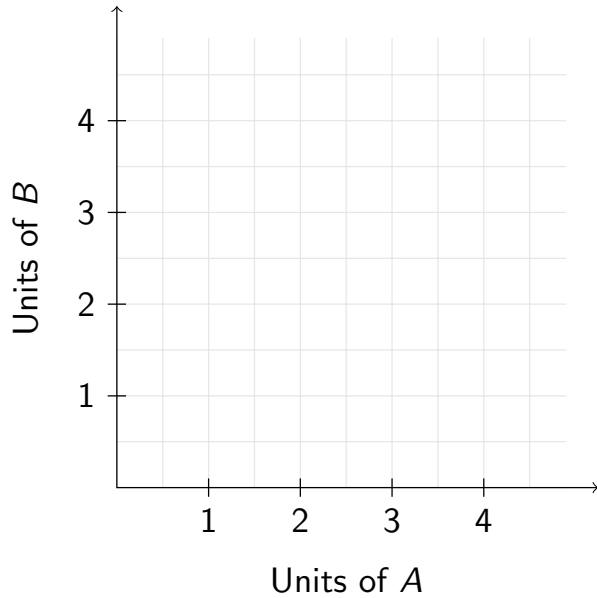


► Examples:

## Cobb-Douglas Utility

### Definition (Cobb-Douglas Utility Function)

► Properties:



## Quasi-Linear Utility

### Definition (Quasi-Linear Utility Function)

