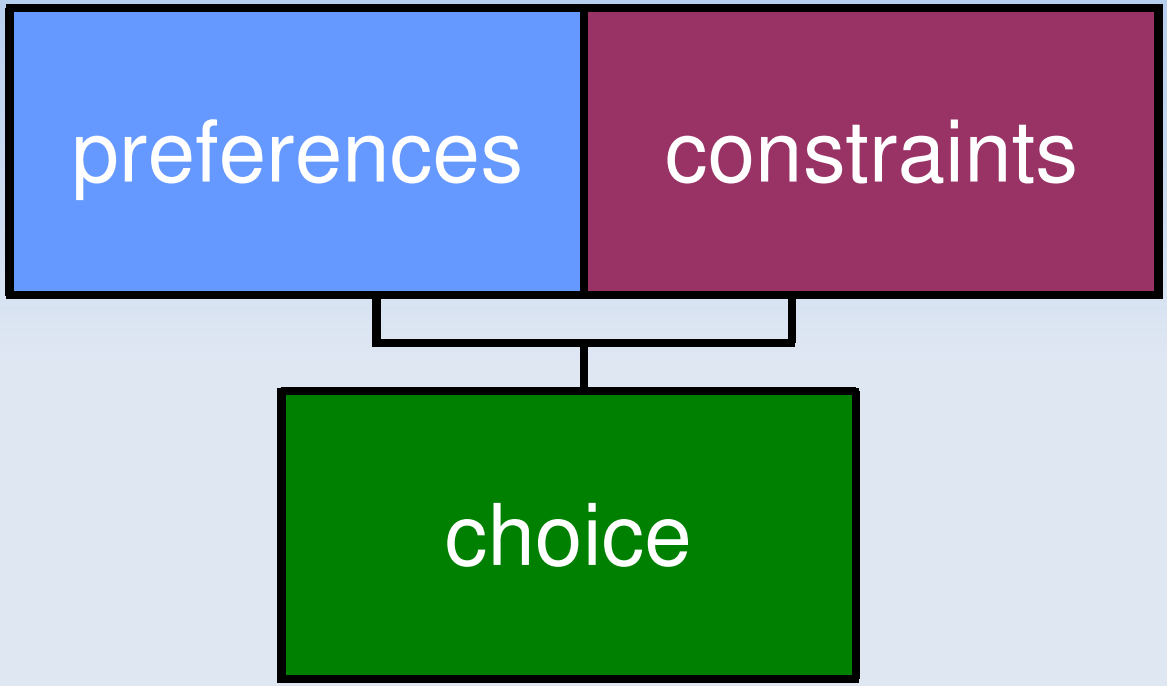
Intermediate Microeconomics

Chapter 2
Consumer Choice

Theory of choice

- Purposes:
  - derive the demand curve
  - general framework for understanding human behavior
  - normative analysis of effects of various interventions in the market
- Three steps required:
  - know what the consumer wants
  - know what the consumer can
  - combine preferences and constraints ⇒ feasible choices

Consumer theory

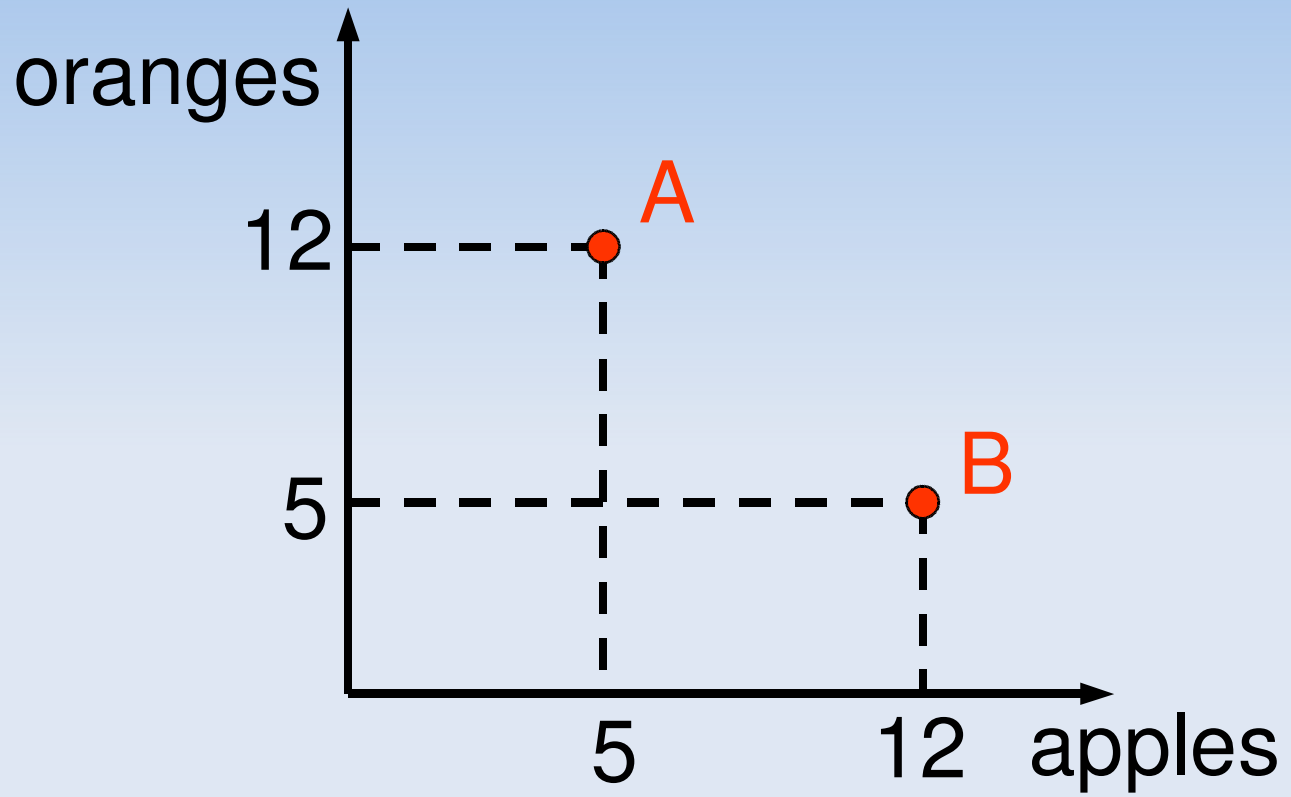


Taking constraints into account, an individual attempts to reach the highest FEASIBLE level of satisfaction

Tastes

- Goods = anything that affects positively an individual's level of satisfaction when consumed
- It is very difficult to analyze tastes for *all* goods, so we will simplify the model to only two goods
- Bundle = a combination of quantities of the two goods
- Will analyze consumer's preferences for bundles (i.e., for various combinations of the two goods)

Consumption bundles



Bundle A: 5 apples, 12 oranges

Bundle B: 12 apples, 5 oranges

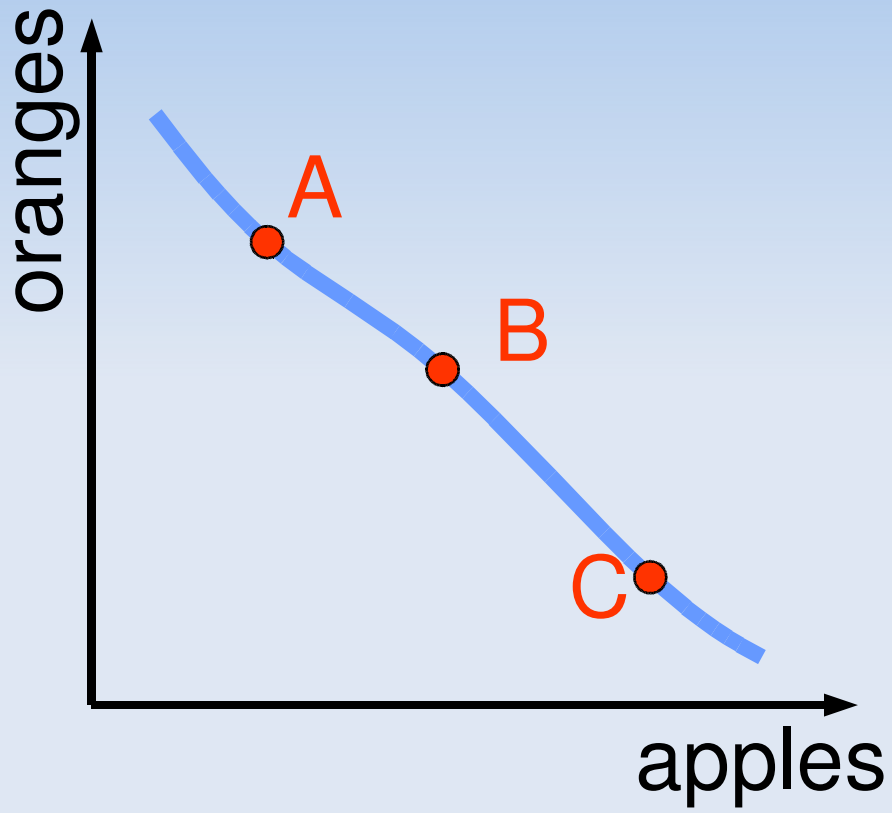
Axioms of consumer theory

1. Completeness
   - any two bundles A and B can be compared to each other: either A is preferred to B, or B is preferred to A, or they are equally preferred
2. Transitivity
   - if bundle A is preferred to bundle B and bundle B is preferred to bundle C, then A is preferred to C
3. Nonsatiation (”more is better”)
   - if bundle A has more of at least one good than bundle B (and not less of either), than A is preferred to B

Indifference curves

- If the previous three axioms are satisfied, then there exists a preference ordering (i.e., all bundles can be placed in an order of preference)
- Indifference curve = set of bundles among which the individual is indifferent
- Thus, the level of satisfaction is constant along an indifference curve ⇒ they *can't intersect*
- When analyzing goods, indifference curves *always slope downwards* (because of nonsatiation)

Indifference curves – example



Bundles A, B and C lie on the same indifference curve. Hence, the consumer is indifferent among them

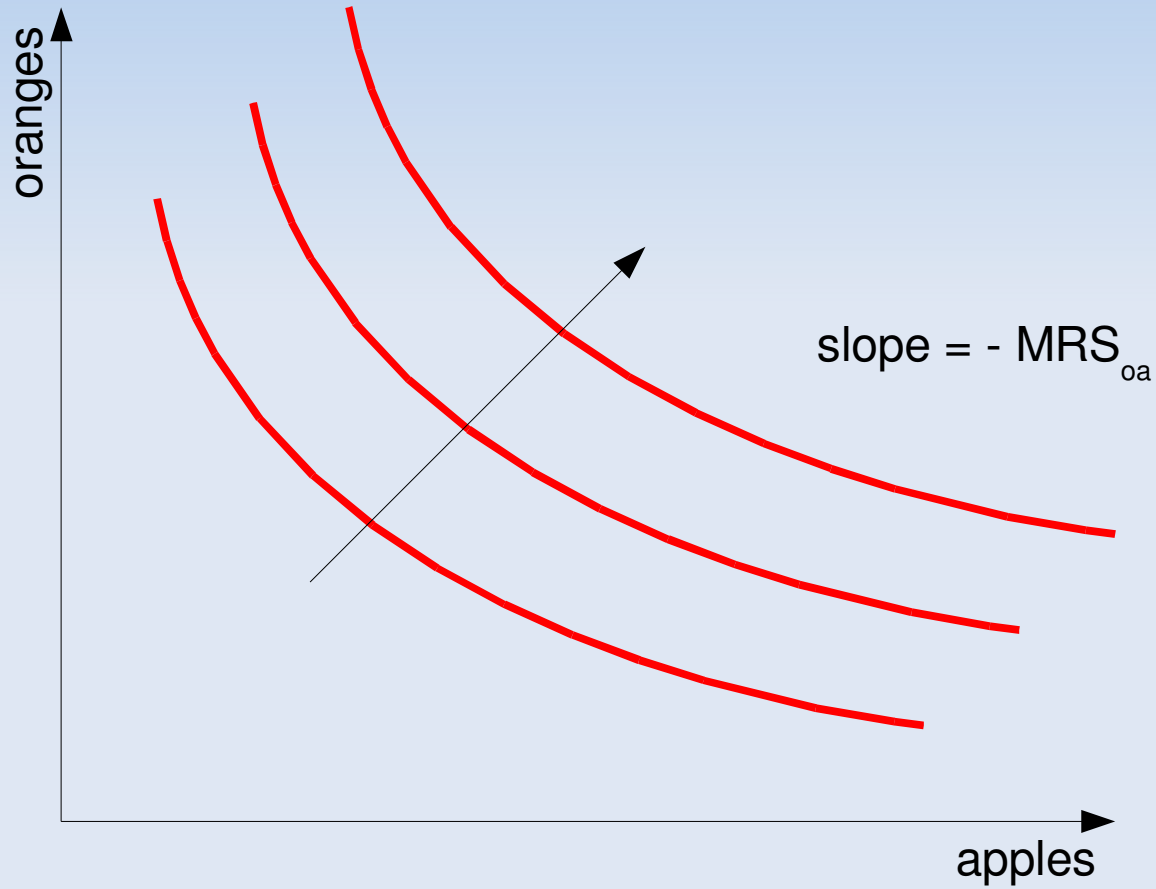
Marginal rate of substitution

- Marginal rate of substitution (MRS):
  - the rate at which the consumer is willing to trade one good for the other
  - the negative of the slope of the indifference curve
- Axiom 4 in consumer theory: Decreasing MRS
  - as the individual has more of one good, the value of an additional unit of that same good becomes lower (and the value of an additional unit of the other good becomes relatively higher)

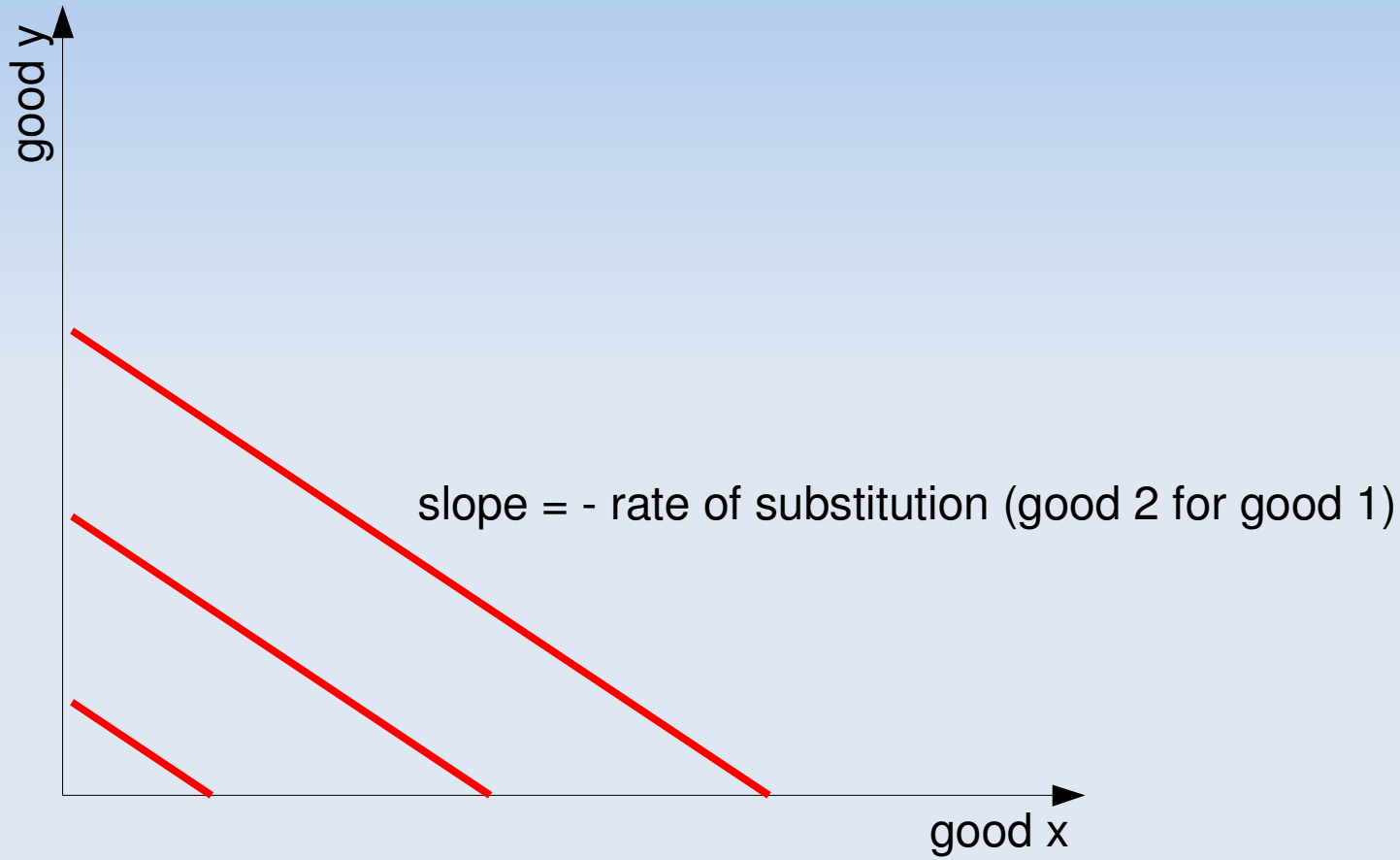
Indifference maps

- Indifference map = entire collection of indifference curves
- Properties of indifference curves:
  - downward slope
  - negative of slope = MRS
  - diminishing MRS (convex)
  - can't cross (”parallel”)
  - indifference curves to the north-east represent higher levels of satisfaction

Indifference maps – example

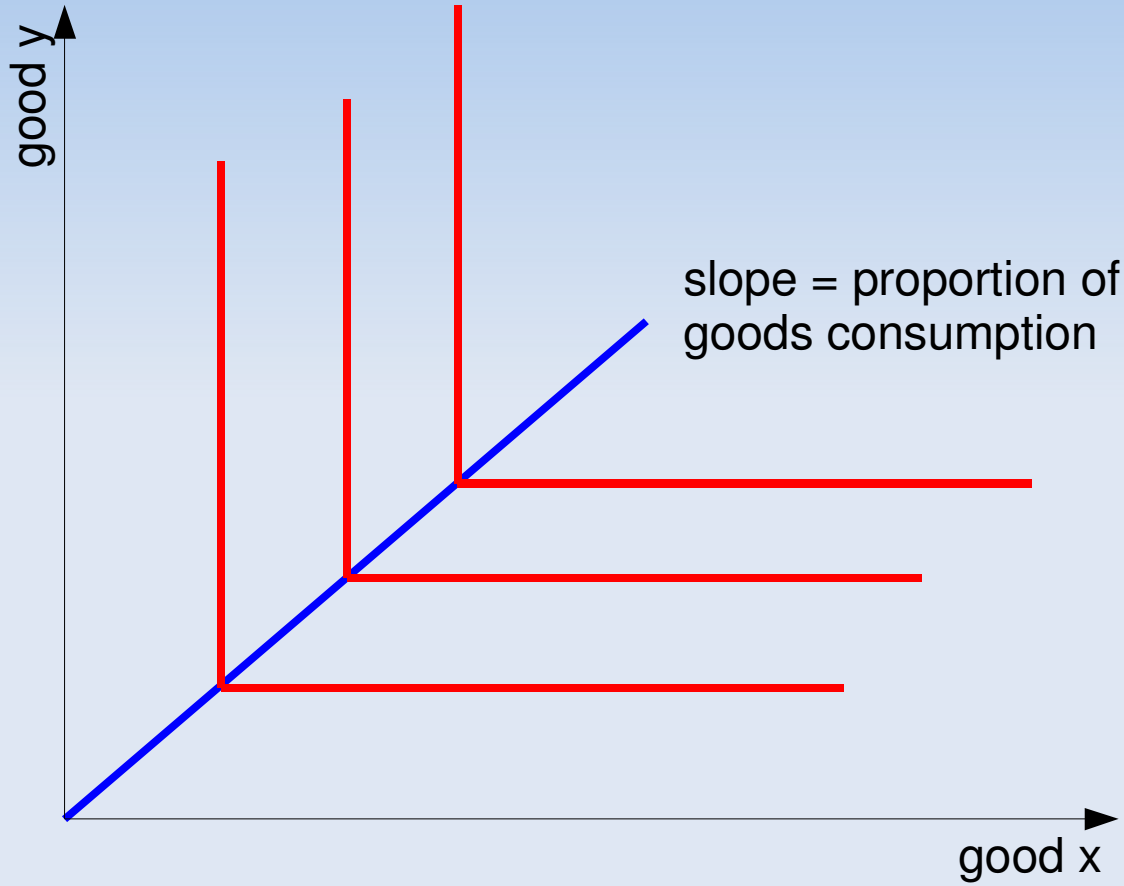


Indifference curves: Perfect substitutes



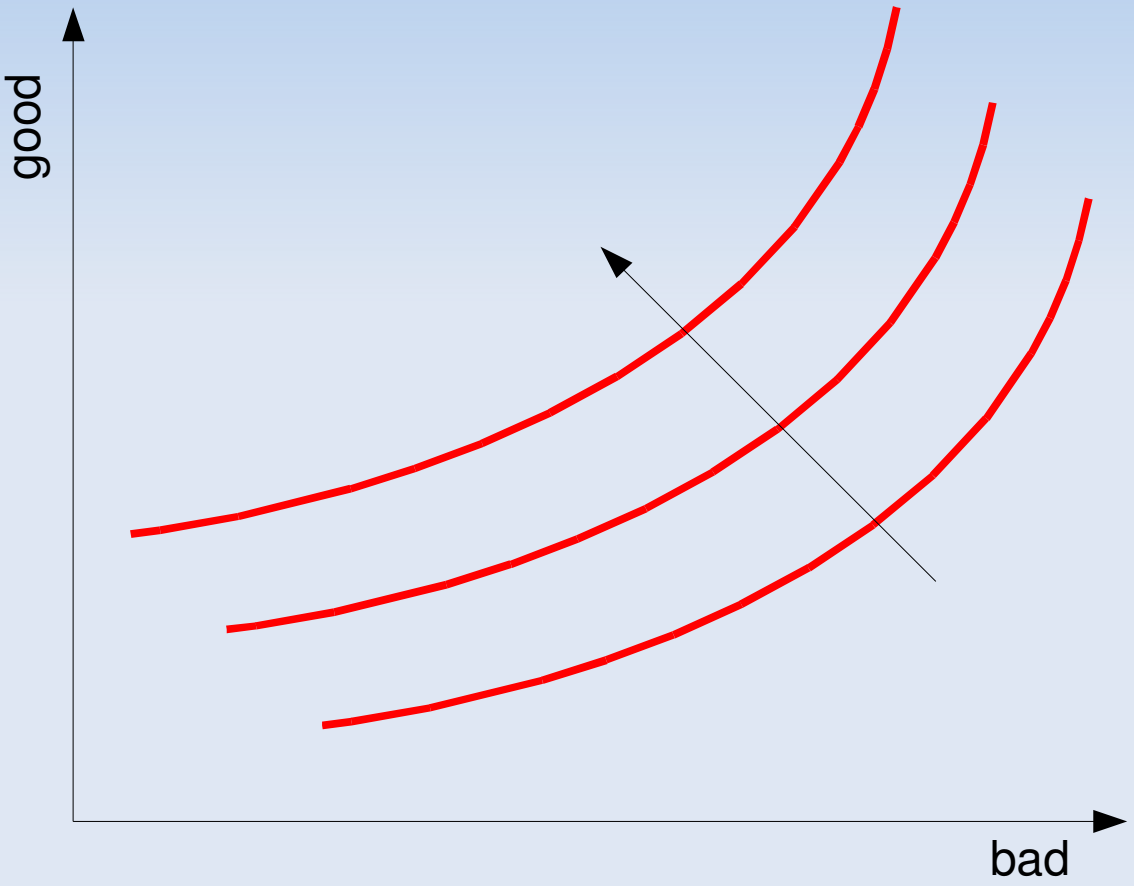
Perfect substitutes = goods that can be substituted for each other at a constant rate

Indifference curves: Perfect complements



Perfect complements = goods that have to be consumed in fixed proportions

Indifference maps – example



Utility theory

- Total utility = total satisfaction, quantified in a numerical score, of consuming a particular commodity bundle
- Utility function = a formula showing the total utility associated with each bundle
  - quantity of good 1: x
  - quantity of good 2: y
  - utility function: $U(x, y)$
- Utility is measured in an abstract unit called *util*

Cardinal vs. ordinal utility

- *Cardinal* utility assigns numeric values to satisfaction from consuming bundles
- *Ordinal* utility only ranks the bundles in terms of the satisfaction they give
- The interpretation of utility is necessarily *ordinal*:
  - among bundles
  - across individuals (interpersonal comparisons)

  ⇒ more than one utility function can represent the same preferences!

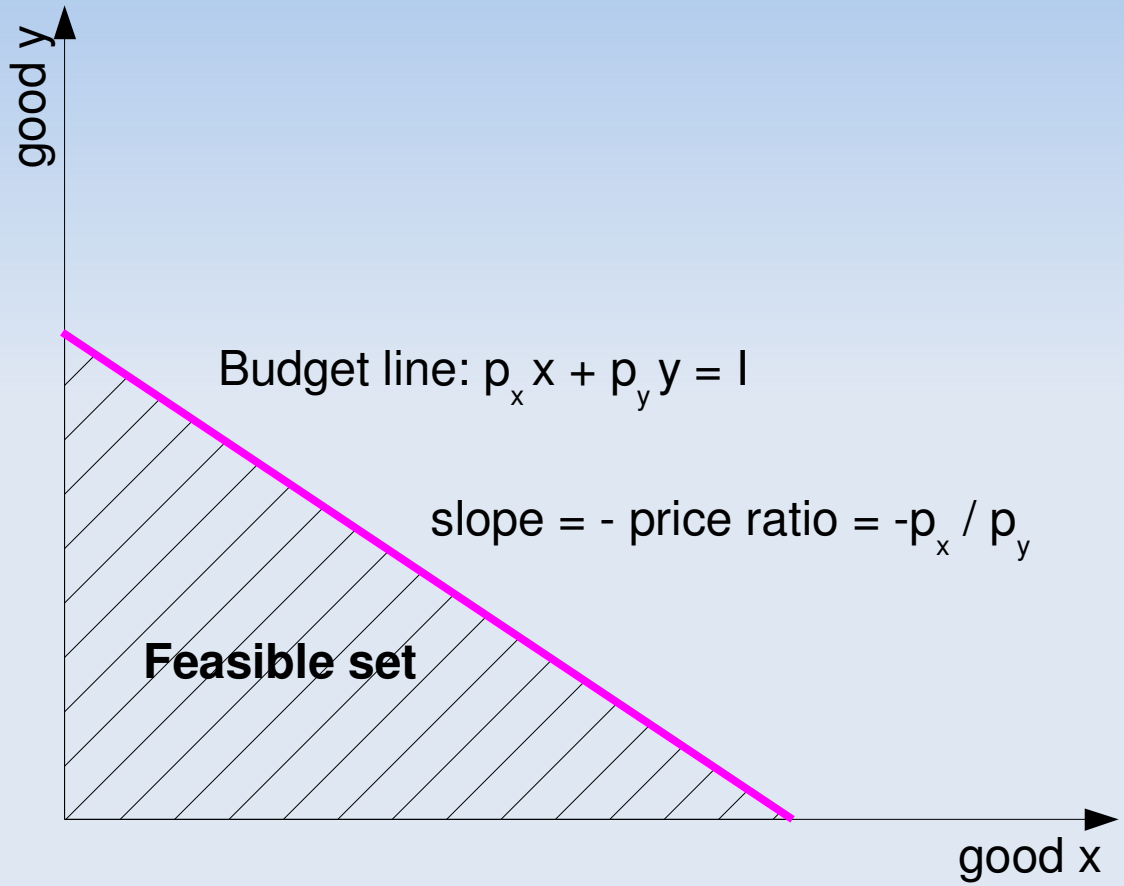
Utility function

- Ordinal:
  - $U(A) > U(B) \Rightarrow$ bundle A is (strictly) preferred to bundle B
  - $U(A) = U(B) \Rightarrow$ bundle A gives the same level of satisfaction as bundle B
- But *not* cardinal:
  - $U(A) = 2\,U(B) \nRightarrow$ bundle A is two times more preferred to bundle B (?!?)
- Indifference curve = same level of utility

Budget constraint

- Consumers are assumed to be *price-takers*, i.e. the unit price of commodities is not influenced by the quantity purchased
- A bundle is affordable if it costs less than the individual's income
- Budget constraint = a representation of the bundles among which a consumer may choose, given their income and prices faced
- Feasible set = the set of all bundles that are affordable ⇒ bounded by the budget constraint

Linear budget constraint

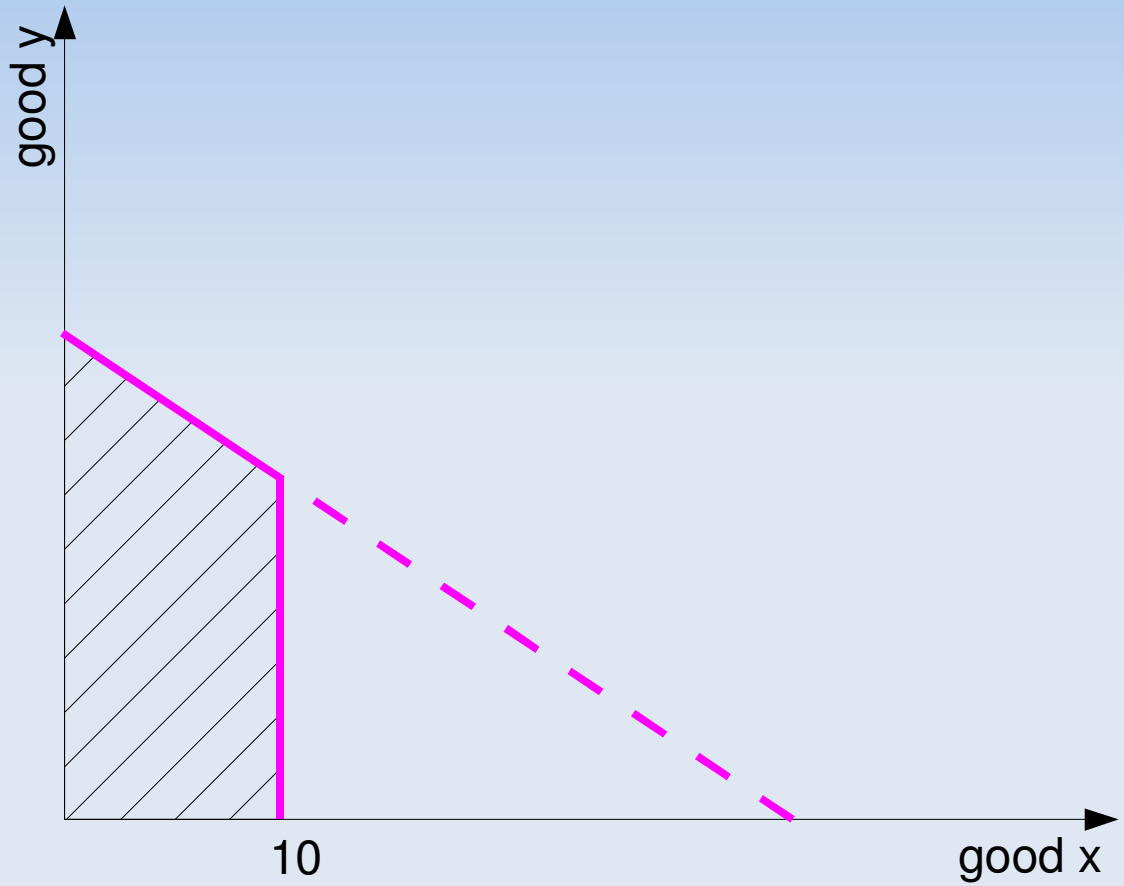


Intercepts = bundles including only the good represented on that axis

Price and income changes

- Effects on linear budget constraint:
  - change in income ⇒ parallel shift in the budget line
  - change in prices ⇒ rotation (tilting) of the budget line:
    - if price of good 1 increases, then budget line moves along the horizontal axis, toward the origin (tilts in)
    - if price of good 1 falls, then budget line moves along the horizontal axis, away from the origin (tilts out)

Nonlinear budget constraint: Quantity rationing



The maximum allowed consumption of good x is 10 units

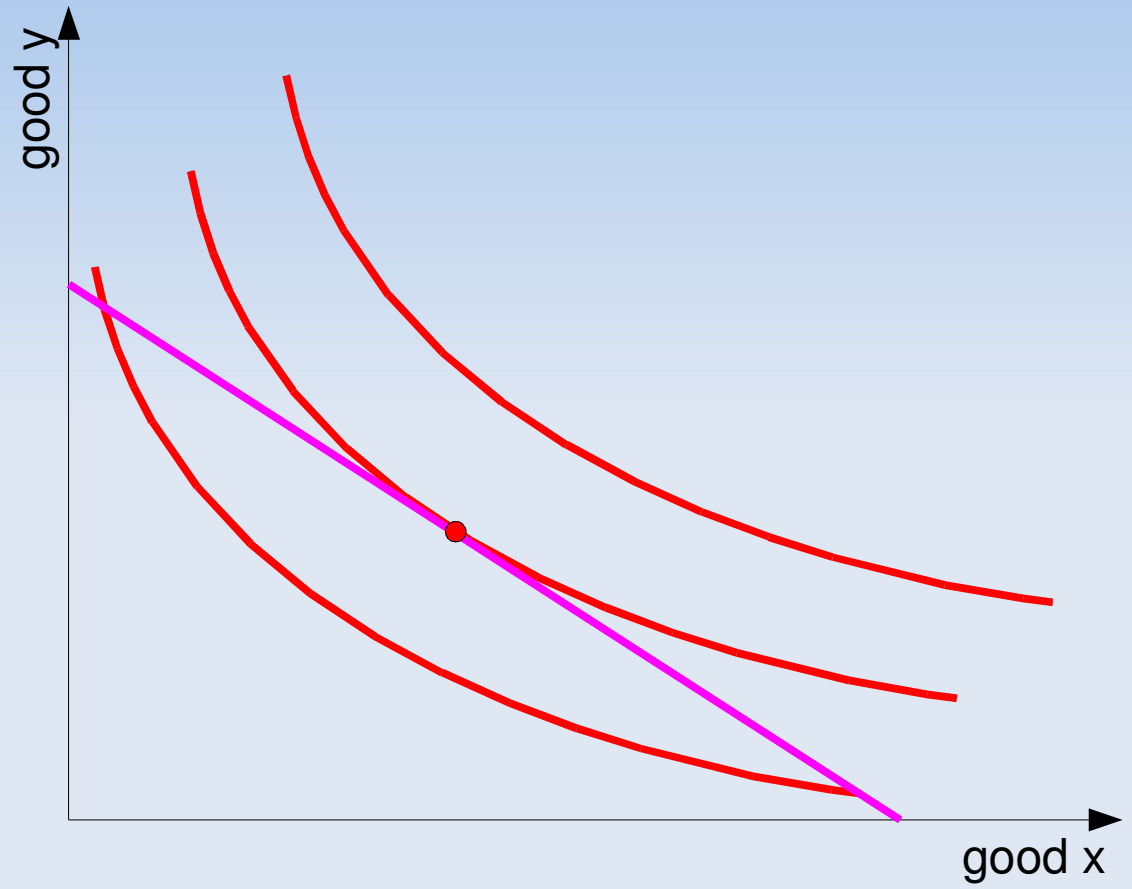
Nonlinear budget constraint: Quantity discounts

If consumption of good x is higher than 10 units, then price of good x is lowered

Consumer's choice

- Indifference map shows what the consumer *would want* to do
- Budget constraint shows what the consumer *can* do
- The choice of the consumer is the result of combining the two

Interior solution



Interior solution = an optimal bundle that contains some amount of each good

Equilibrium with interior solution

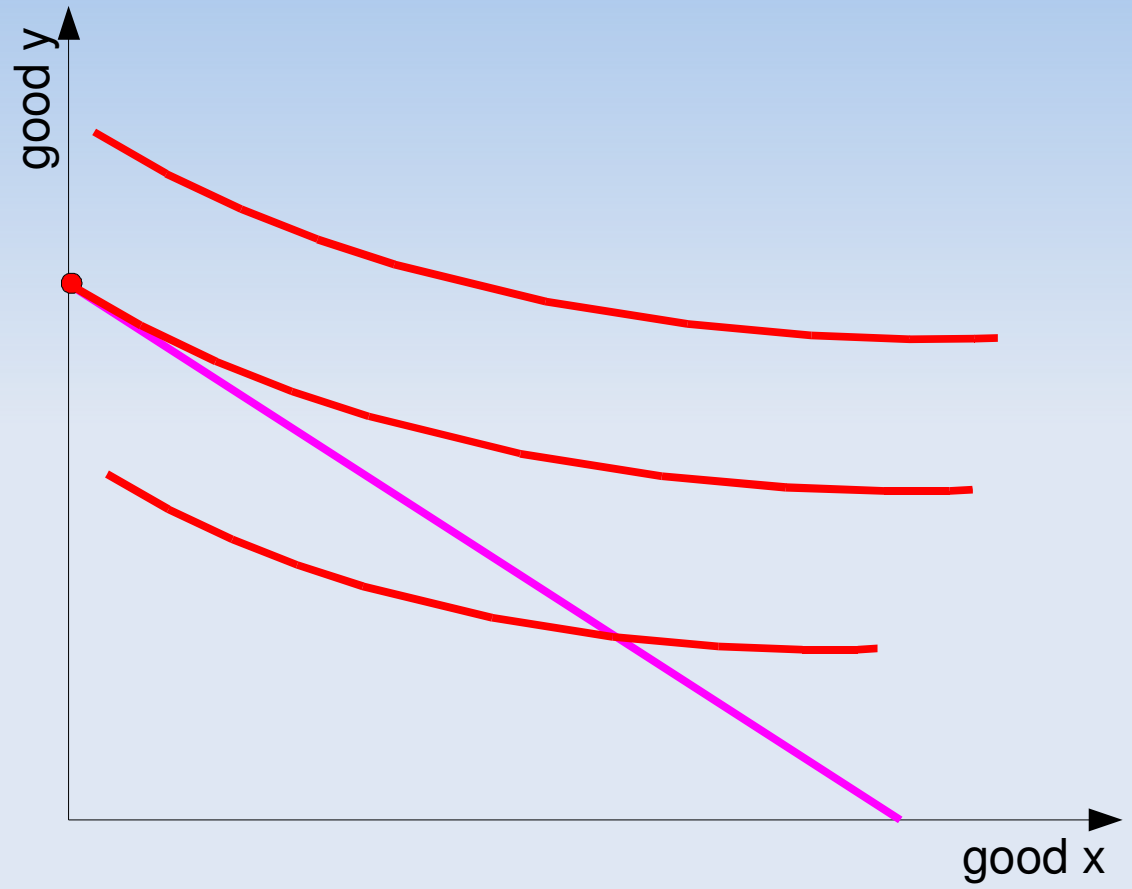
- Indifference curve is tangent to budget line ⇒ slope of the two must be equal
  - slope of budget line = rate at which the consumer is able to trade one good for the other
  - slope of indifference curve = MRS = rate at which consumer is willing to trade one good for the other

- Hence, in equilibrium:

$$\text{MRS} = \text{price ratio}$$

$$MRS_{yx} = p_x / p_y$$

Corner solution



Corner solution = an optimal bundle where the consumption of one of the goods is zero

Equilibrium with corner solution

- Indifference curve is *not* tangent to budget line anymore ⇒ slopes are *not* (necessarily) equal
- As a matter of fact, in equilibrium:

$$\text{MRS} \leq \text{price ratio}$$

$$MRS_{yx} \leq p_x / p_y$$

Marginal utility

- Marginal utility (MU) = the change in utility due to a ”unit” change in one of the goods, everything else equal
- Mathematically:

$$MU_x = \frac{\partial U}{\partial x}$$

- Hence, if the quantity of good x consumed changes by a small amount Δx, then the change in utility is:

$$\Delta U = MU_x \, \Delta x$$

Utility and optimal bundle

- Along an indifference curve, utility is constant ⇒ small changes in the bundle leave the utility unchanged ($\Delta U = 0$)
- Both the quantity of good x and of good y change, therefore:

$$\Delta U = MU_x \, \Delta x + MU_y \, \Delta y = 0$$

- Hence:

$$-\frac{\Delta y}{\Delta x} = \frac{MU_x}{MU_y}$$

Utility and optimal bundle

- But: $-\Delta y / \Delta x$ is the slope of the indifference curve, hence equal to the marginal rate of substitution
- Therefore, $MRS_{yx} = MU_x / Mu_y$
- Finally, at the optimal bundle, MRS_{yx} equals the price ratio (tangency condition)
- This means that the optimal bundle satisfies:

$$\frac{MU_x}{MU_y} = \frac{p_x}{p_y}$$