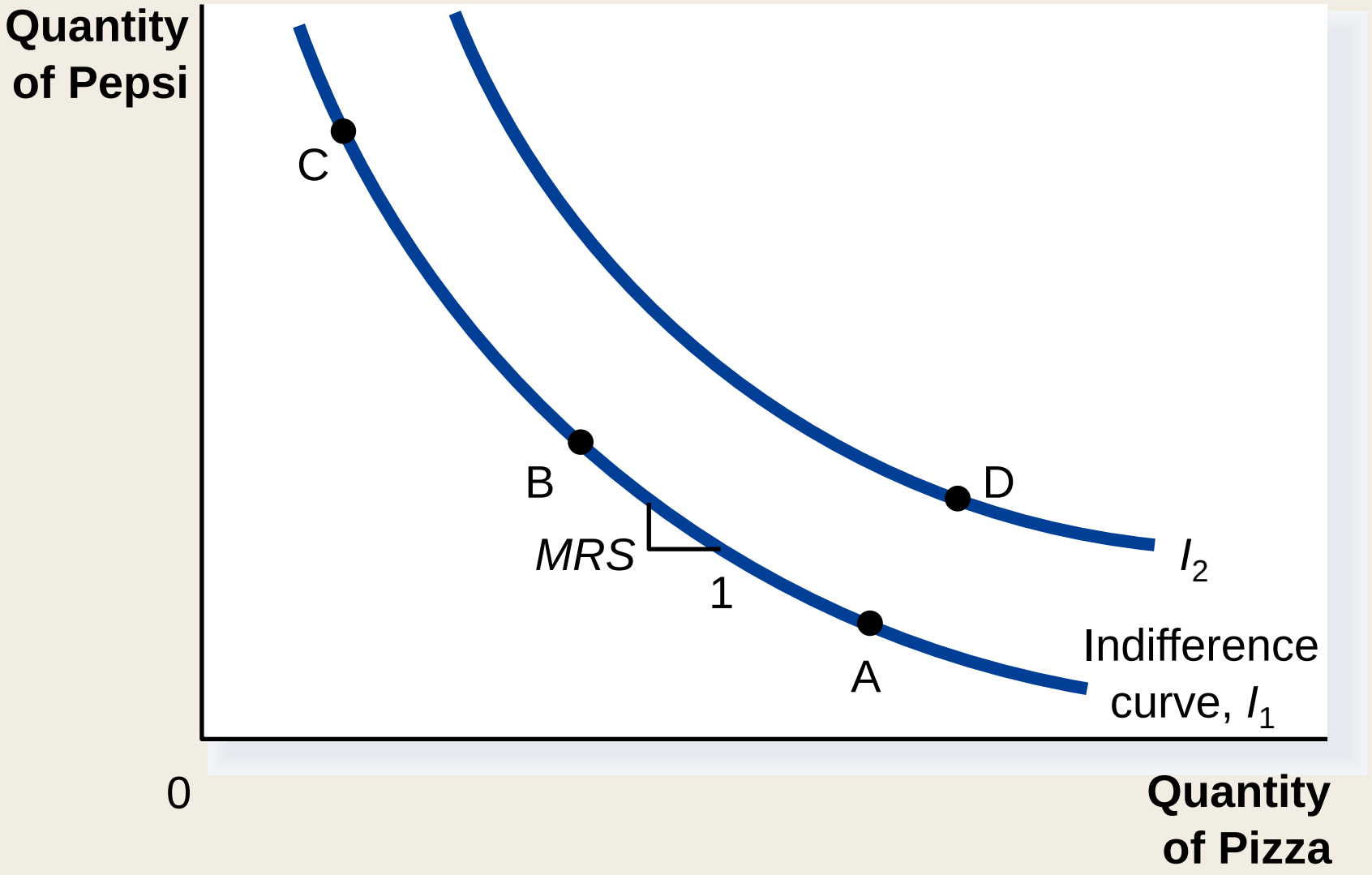
Representing Preferences with Indifference Curves

- The Consumer's Preferences
  - The consumer is indifferent, or equally happy, with the combinations shown at points A, B, and C because they are all on the same curve.
- The Marginal Rate of Substitution
  - The slope at any point on an indifference curve is the *marginal rate of substitution*.
    - It is the rate at which a consumer is willing to trade one good for another.
    - It is the amount of one good that a consumer requires as compensation to give up one unit of the other good.

Figure 2 The Consumer's Preferences



Four Properties of Indifference Curves

- Higher indifference curves are preferred to lower ones.
- Indifference curves are downward sloping.
- Indifference curves do not cross.
- Indifference curves are bowed inward.

Four Properties of Indifference Curves

- Property 1: Higher indifference curves are preferred to lower ones.
  - Consumers usually prefer more of something to less of it.
  - Higher indifference curves represent larger quantities of goods than do lower indifference curves.

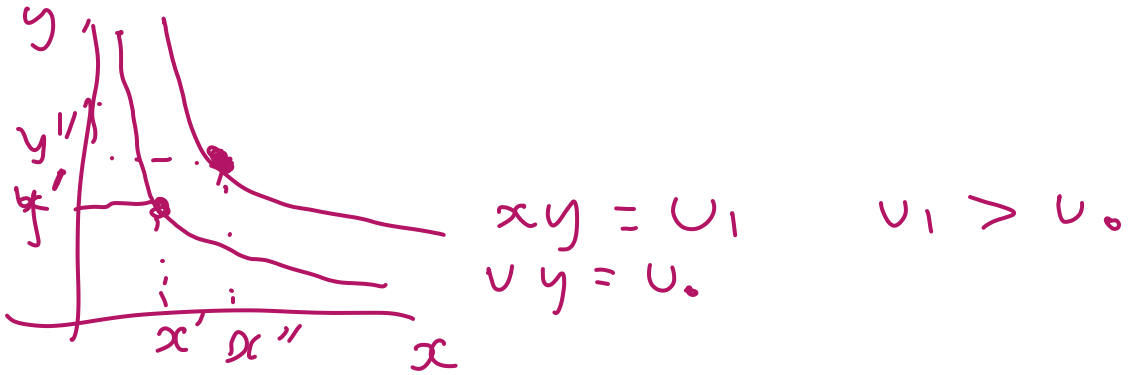
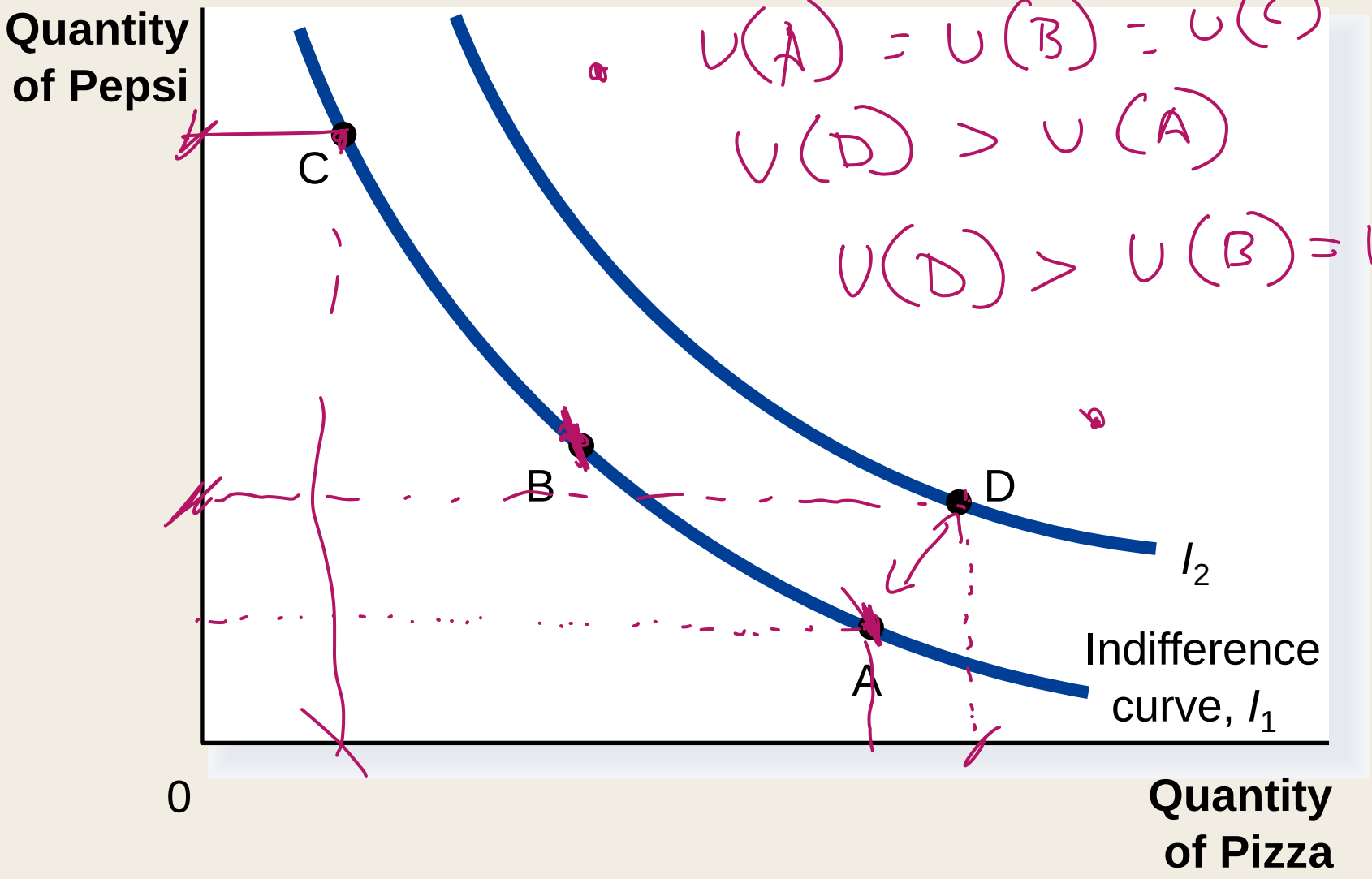


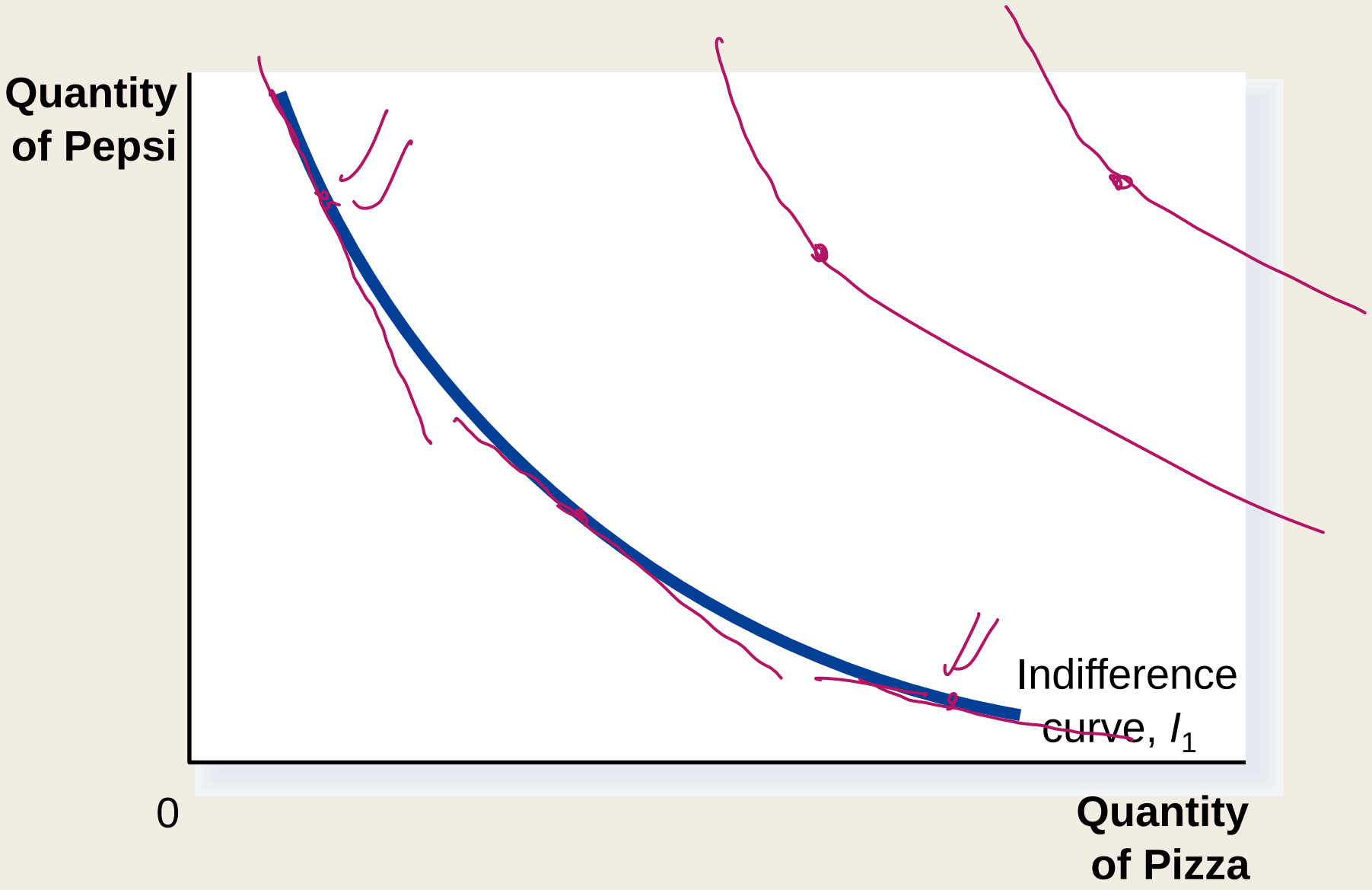
Figure 2 The Consumer's Preferences



Four Properties of Indifference Curves

- Property 2: Indifference curves are downward sloping.
  - A consumer is willing to give up one good only if he or she gets more of the other good in order to remain equally happy.
  - If the quantity of one good is reduced, the quantity of the other good must increase.
  - For this reason, most indifference curves slope downward.
  - Remember, a consumer is equally happy at all points along a given indifference curve.

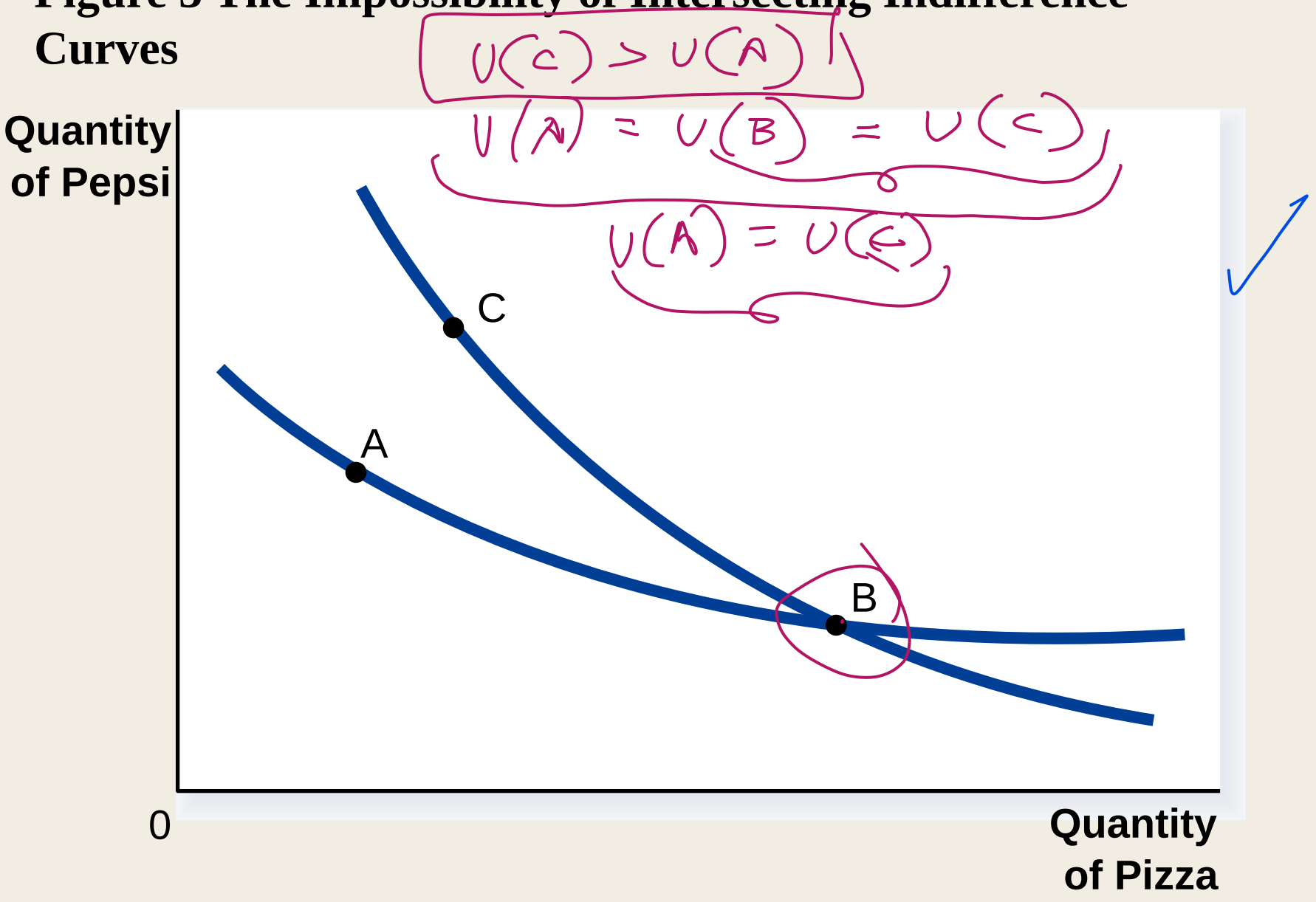
Figure 2 The Consumer's Preferences



Four Properties of Indifference Curves

- Property 3: Indifference curves do not cross.
  - Points A and B should make the consumer equally happy.
  - Points B and C should make the consumer equally happy.
  - This implies that A and C would make the consumer equally happy.
  - But C has more of both goods compared to A.

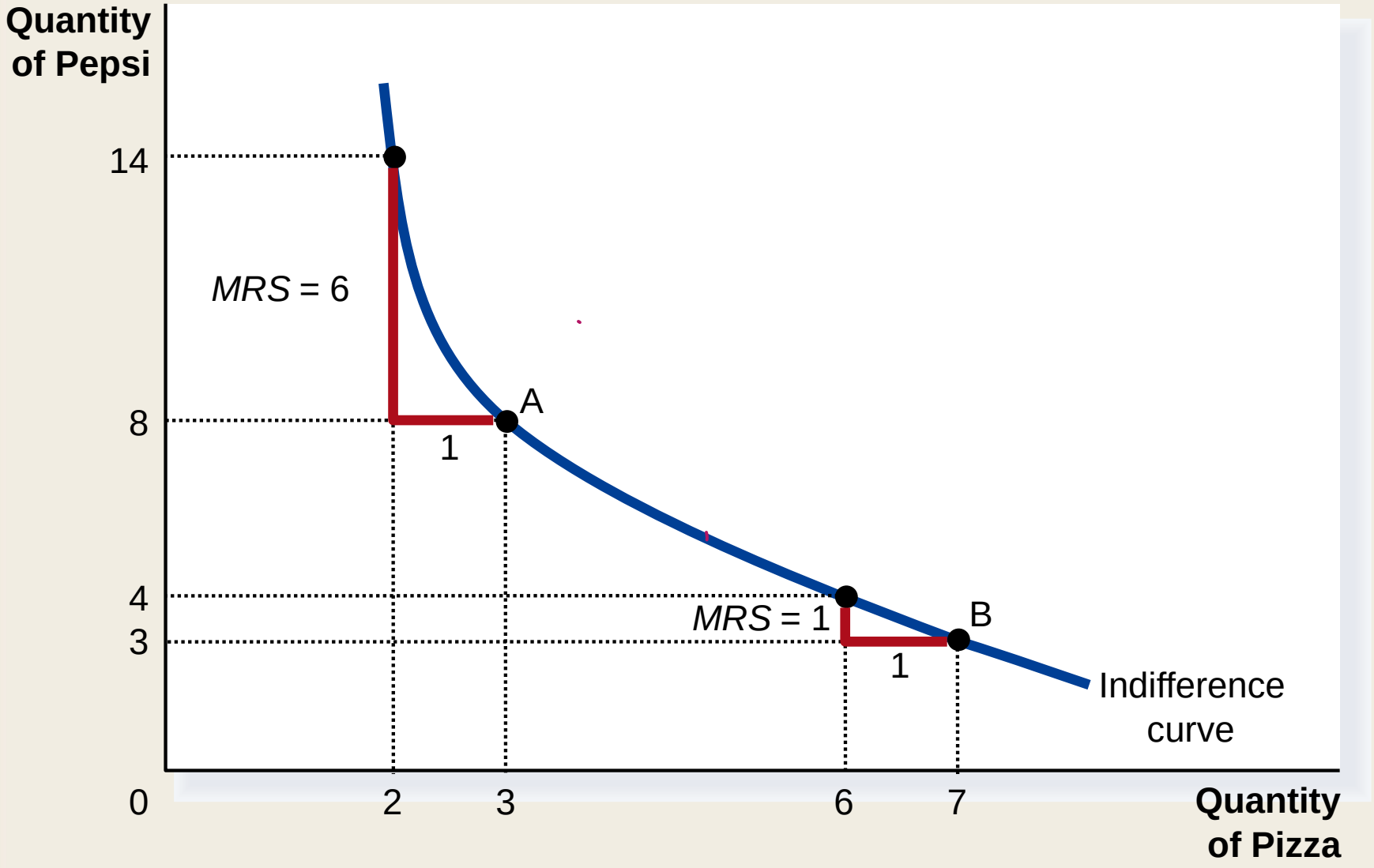
Figure 3 The Impossibility of Intersecting Indifference Curves



Four Properties of Indifference Curves

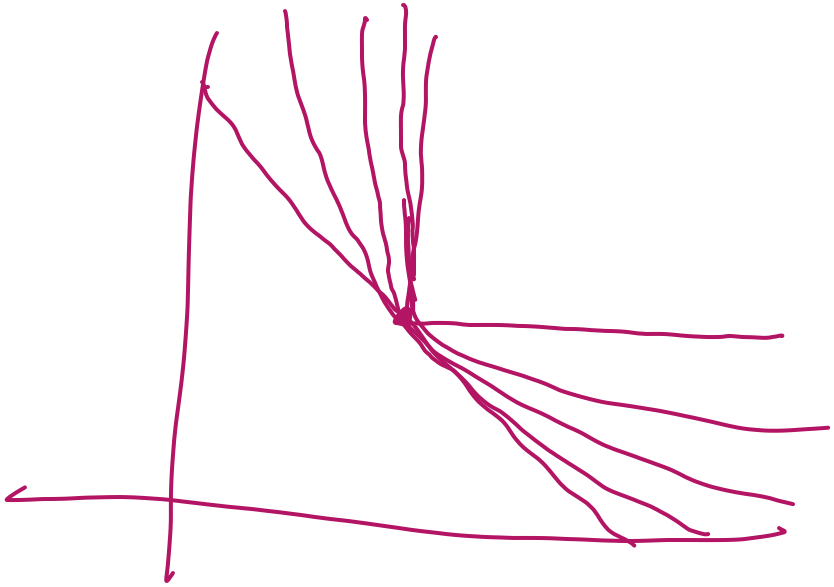
- Property 4: Indifference curves are bowed inward.
  - People are more willing to trade away goods that they have in abundance and less willing to trade away goods of which they have little.
  - These differences in a consumer's marginal substitution rates cause his or her indifference curve to bow inward.

Figure 4 Bowed Indifference Curves



Two Extreme Examples of Indifference Curves

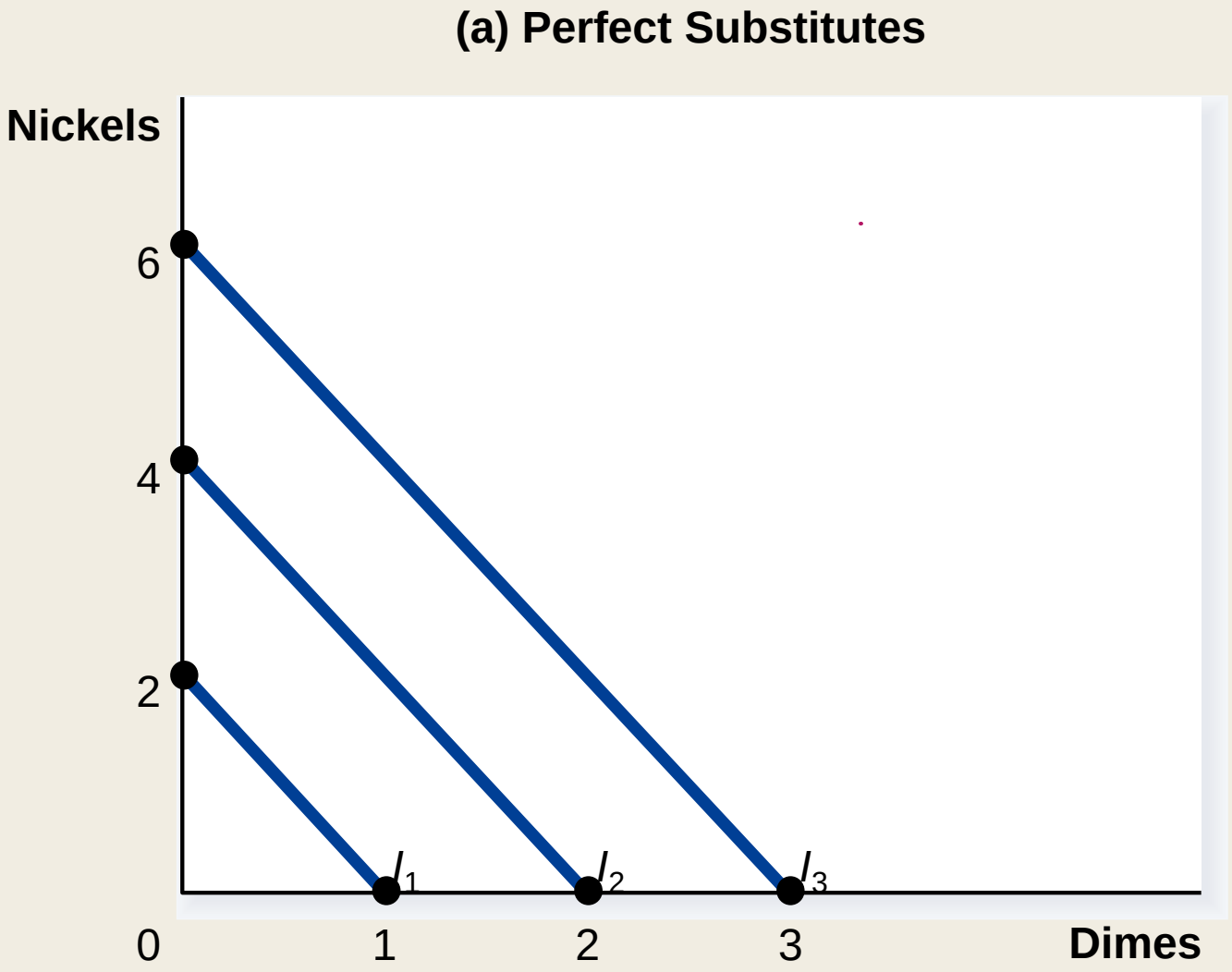
- Perfect substitutes
- Perfect complements



Two Extreme Examples of Indifference Curves

- Perfect Substitutes
  - Two goods with straight-line indifference curves are *perfect substitutes.*
  - The marginal rate of substitution is a fixed number.

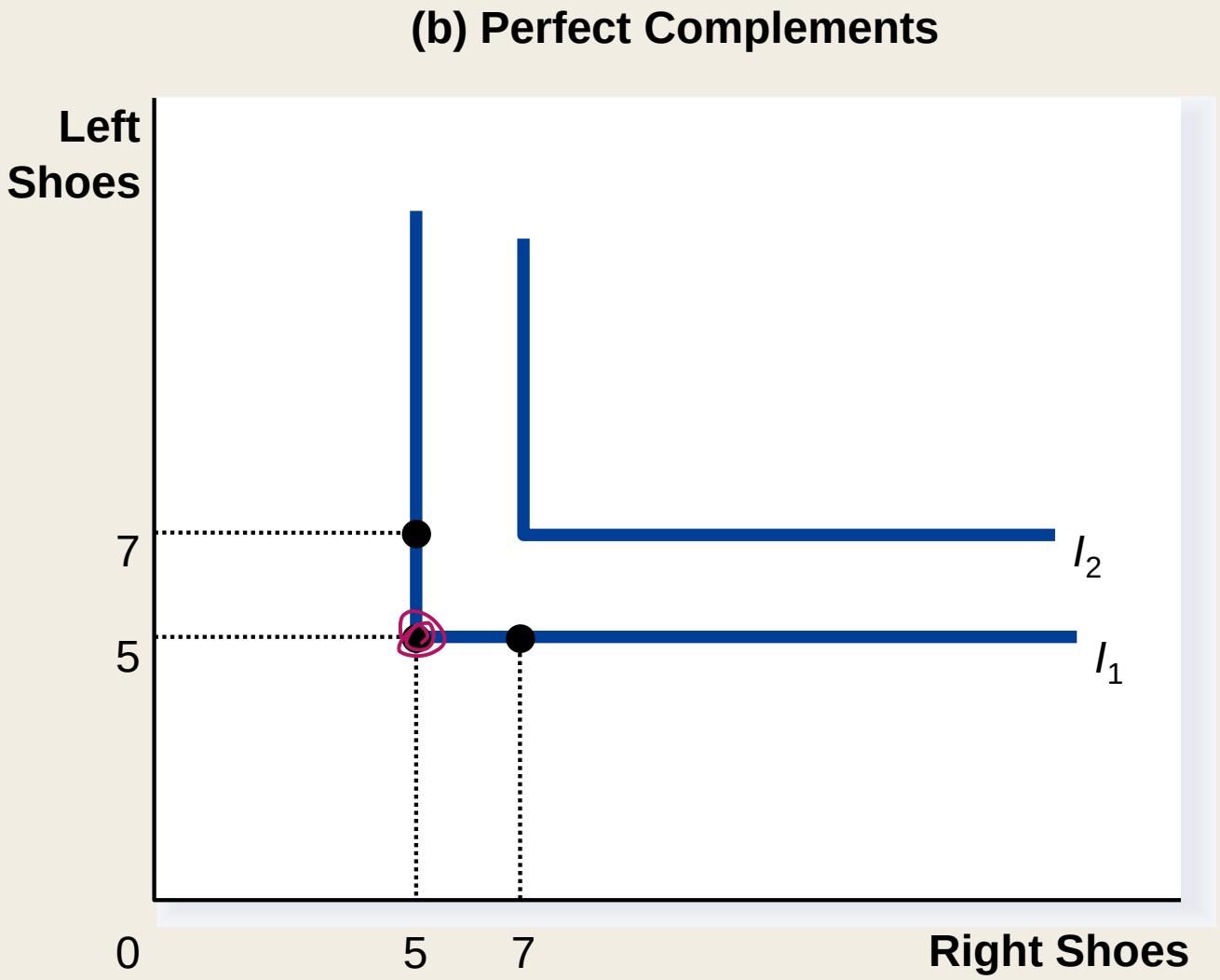
Figure 5 Perfect Substitutes and Perfect Complements



Two Extreme Examples of Indifference Curves

- Perfect Complements
  - Two goods with right-angle indifference curves are *perfect complements.*
  - Since these goods are always used together, extra units of one good, outside the desired consumption ratio, add no additional satisfaction.

Figure 5 Perfect Substitutes and Perfect Complements



OPTIMIZATION: WHAT THE CONSUMER CHOOSES

- Consumers want to get the combination of goods on the highest possible indifference curve.
- However, the consumer must also end up on or below his budget constraint.

$\mathcal{L} = xy + \lambda(I - x - y)$

$\frac{\partial \mathcal{L}}{\partial x} = 0 \Rightarrow y - \lambda = 0$

$\frac{\partial \mathcal{L}}{\partial y} = 0 \Rightarrow x - \lambda = 0$

$x = y$

xy, $x(1-x)$

$x + y = I$, $y = 1 - x$

$\frac{\partial \mathcal{L}}{\partial \lambda} = 0$

$1 - x - y = 0$

The Consumer's Optimal Choices

- Combining the indifference curve and the budget constraint determines the consumer's optimal choice.
- Consider a well-behaved indifference curve that is bowed inward.
- Consumer optimum occurs at the point where the highest indifference curve and the budget constraint are tangent.

The Consumer's Optimal Choice

- The consumer chooses consumption of the two goods so that the marginal rate of substitution equals the relative price.
- At the consumer's optimum, the consumer's valuation of the two goods equals the market's valuation.

$$\mathcal{L} = U(x,y) + \lambda [I - P_x X - P_y Y]$$

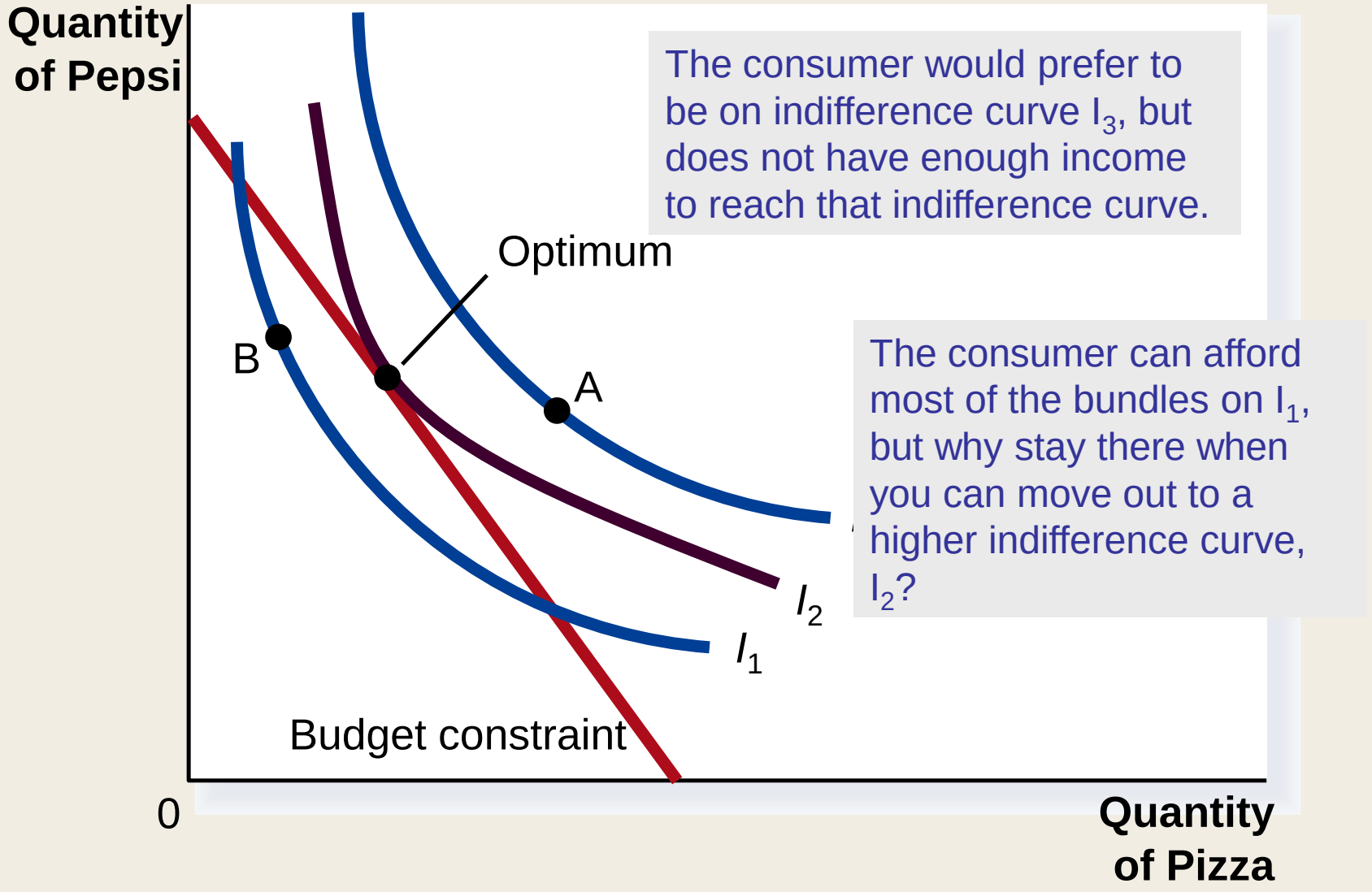
$$\frac{\partial \mathcal{L}}{\partial x} = 0 \Rightarrow \frac{MU_x}{P_x} = \lambda$$

$$\frac{\partial \mathcal{L}}{\partial y} = 0 \Rightarrow \frac{MU_y}{P_y} = \lambda$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 0 \Rightarrow P_x X + P_y Y = I$$

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} \Rightarrow \frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

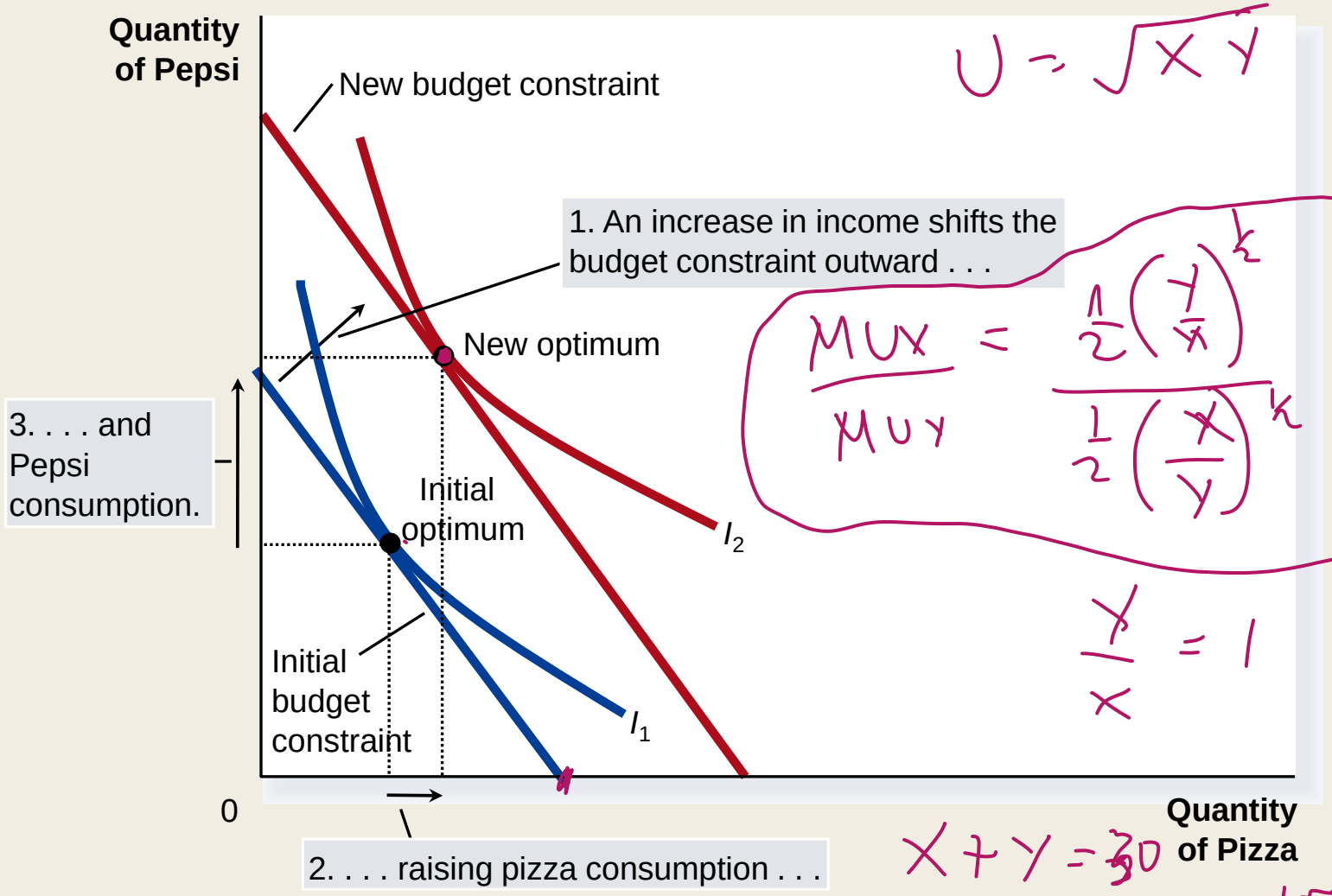
Figure 6 The Consumer's Optimum



How Changes in Income Affect the Consumer's Choices

- An increase in income shifts the budget constraint outward.
  - The consumer is able to choose a better combination of goods on a higher indifference curve.

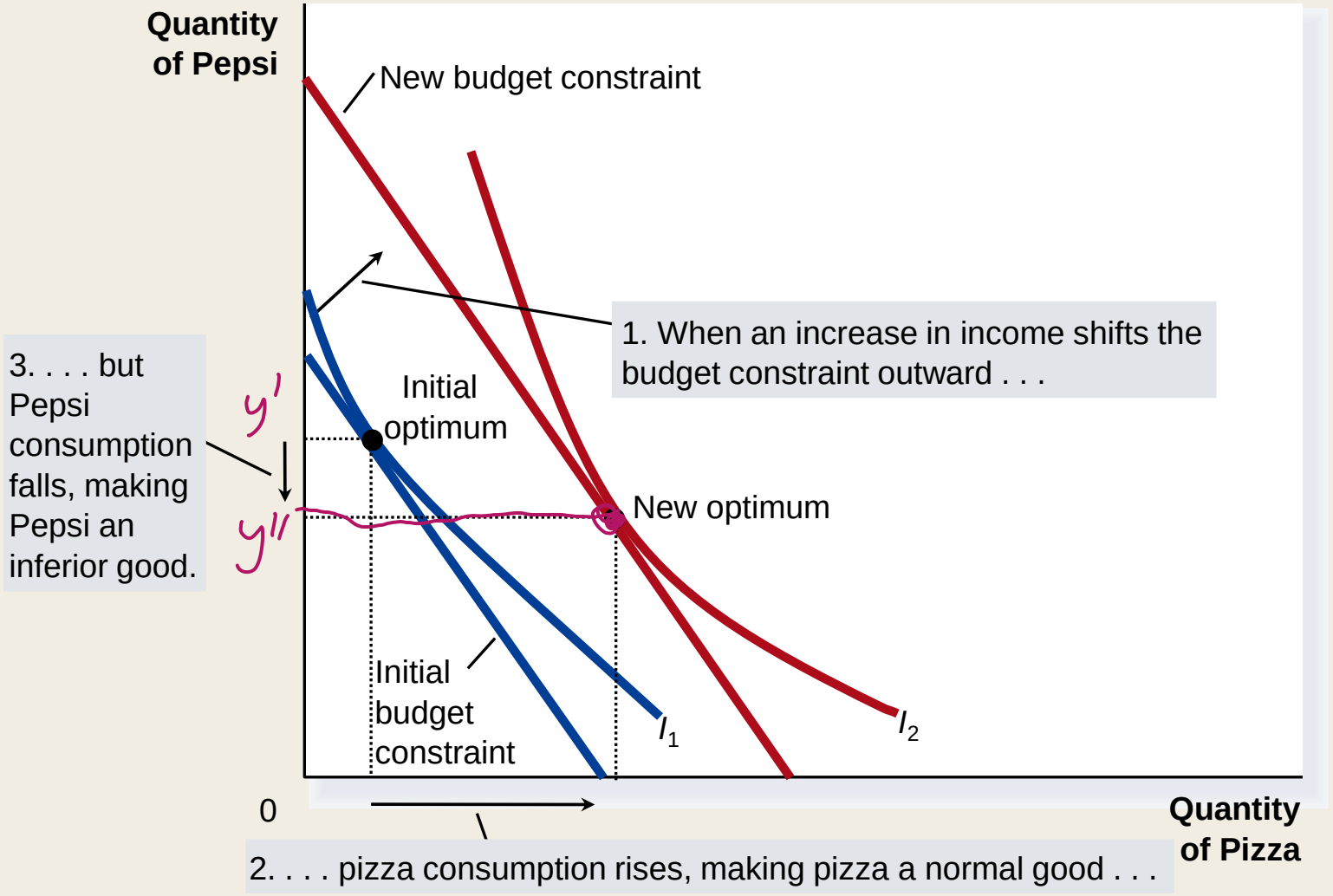
Figure 7 An Increase in Income



How Changes in Income Affect the Consumer's Choices

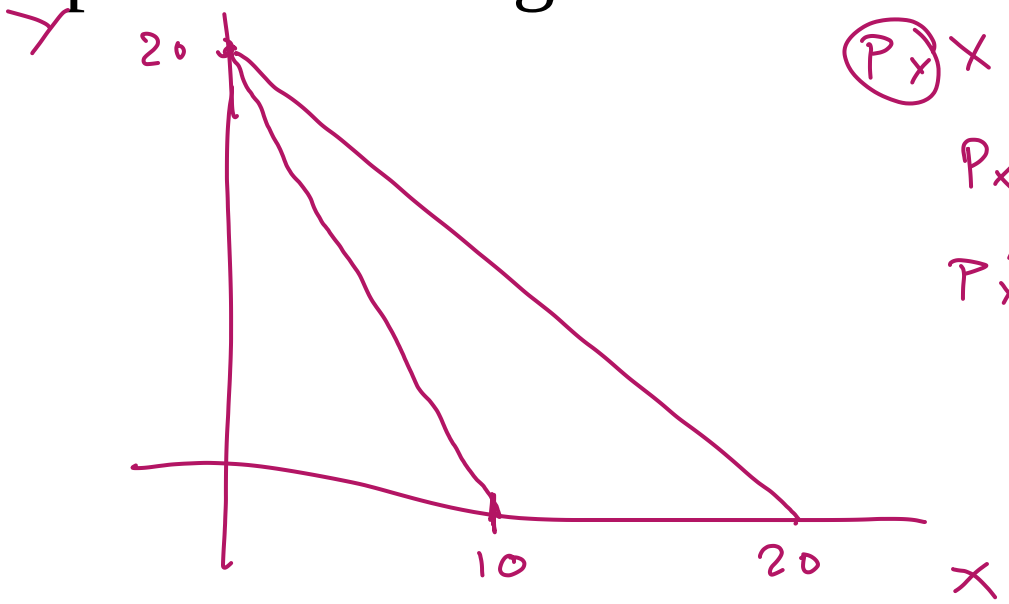
- Normal versus Inferior Goods
  - If a consumer buys more of a good when his or her income rises, the good is called a *normal good.*
  - If a consumer buys less of a good when his or her income rises, the good is called an *inferior good.*

Figure 8 An Inferior Good



How Changes in Prices Affect Consumer's Choices

- A fall in the price of any good rotates the budget constraint outward and changes the slope of the budget constraint.



$\frac{P_X}{P_Y} = \frac{1}{1} = 1$

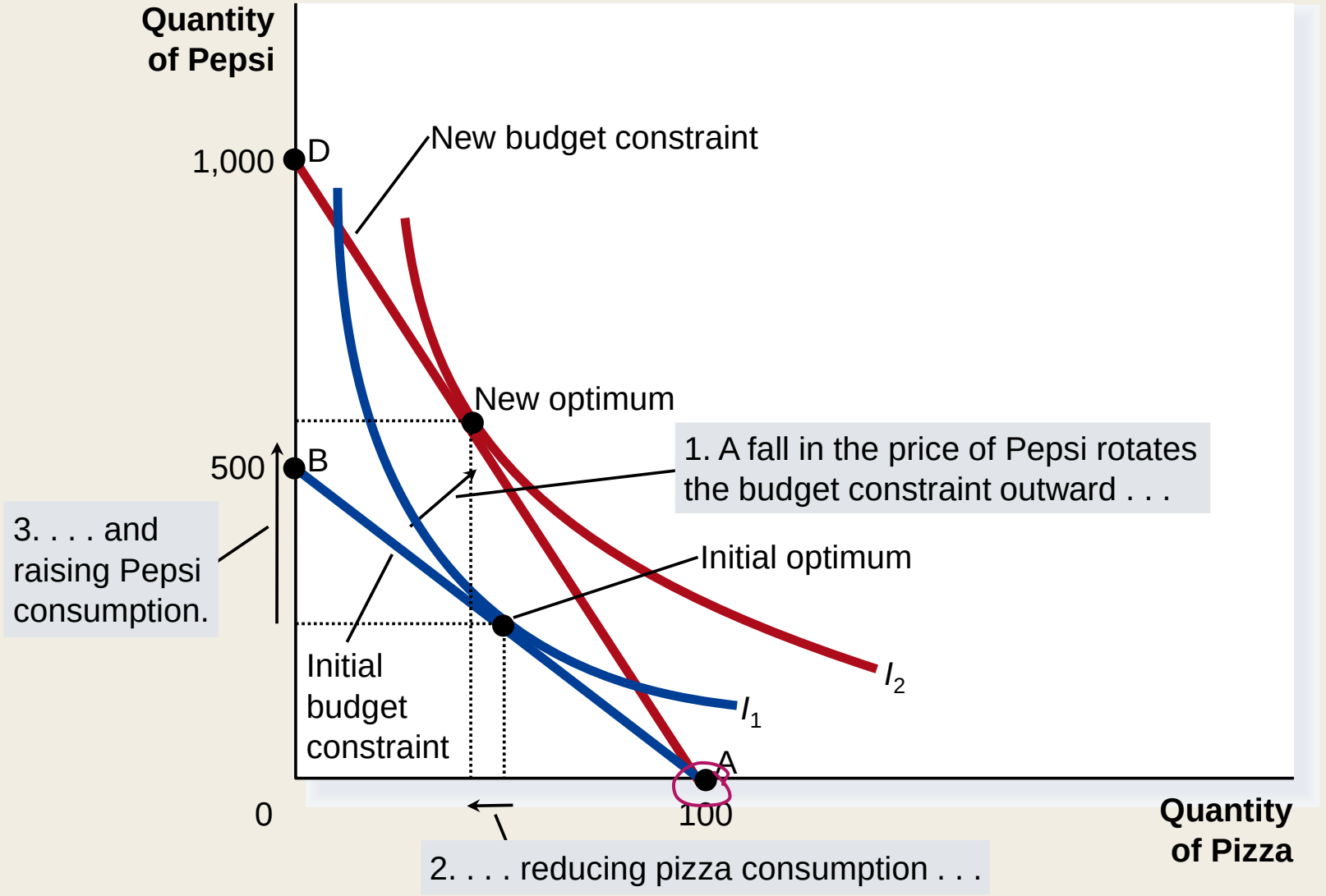
$P_X X + P_Y Y = I = 20$

$P_X = P_Y = 1$

$P_X' = 2$

$\frac{P_X}{P_Y} = \frac{2}{1} \rightarrow 2$

Figure 9 A Change in Price



Income and Substitution Effects

- A price change has two effects on consumption.
  - An income effect
  - A substitution effect

Income and Substitution Effects

- The Substitution Effect
  - The *substitution effect* is the change in consumption that results when a price change moves the consumer along an indifference curve to a point with a different marginal rate of substitution.
- The Income Effect
  - The *income effect* is the change in consumption that results when a price change moves the consumer to a higher or lower indifference curve.