

# Indifference Curve & Budget Line

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# What is Consumer Theory?

- Study of how people use their limited means to make purposeful choices.
- Assumes that consumers understand their choices (possibilities) and the prices (opportunity costs) associated with each choice.
- Assumes that consumers consider the alternatives and choose the one they like best.

# Consumer Theory - Why?

- Two important reasons:
  - to understand the foundations of market demand (bake the demand curve from scratch)
  - to address several interesting consumer theory issues that are best understood using this model rather than the aggregate demand model

# Two Components of Consumer Demand

- Opportunities:
  - What can the consumer afford?
  - What are the consumption possibilities?
  - Summarized by the **budget constraint**
- Preferences:
  - What does the consumer like?
  - How much does a consumer like a good?
  - Summarized by the **utility function**

# What is a Budget Constraint?

- A budget constraint shows the consumer's purchase opportunities as every combination of two goods that can be bought at given prices using a given amount of income.
- The budget constraint measures the combinations of purchases that a person can afford to make with a given amount of monetary income.

# Li's Demand for Wheat and Rice

- Illustration of consumer theory
- Li's demand for wheat and rice depends upon the prices for these goods, her income, and her preferences.
- Suppose we look first at her budget constraint:
  - Wheat costs \$4/lb.
  - Rice costs \$2/lb.
  - Li has \$40 of income.

# Li's Budget Constraint

- The mathematical expression for Li's budget constraint is:

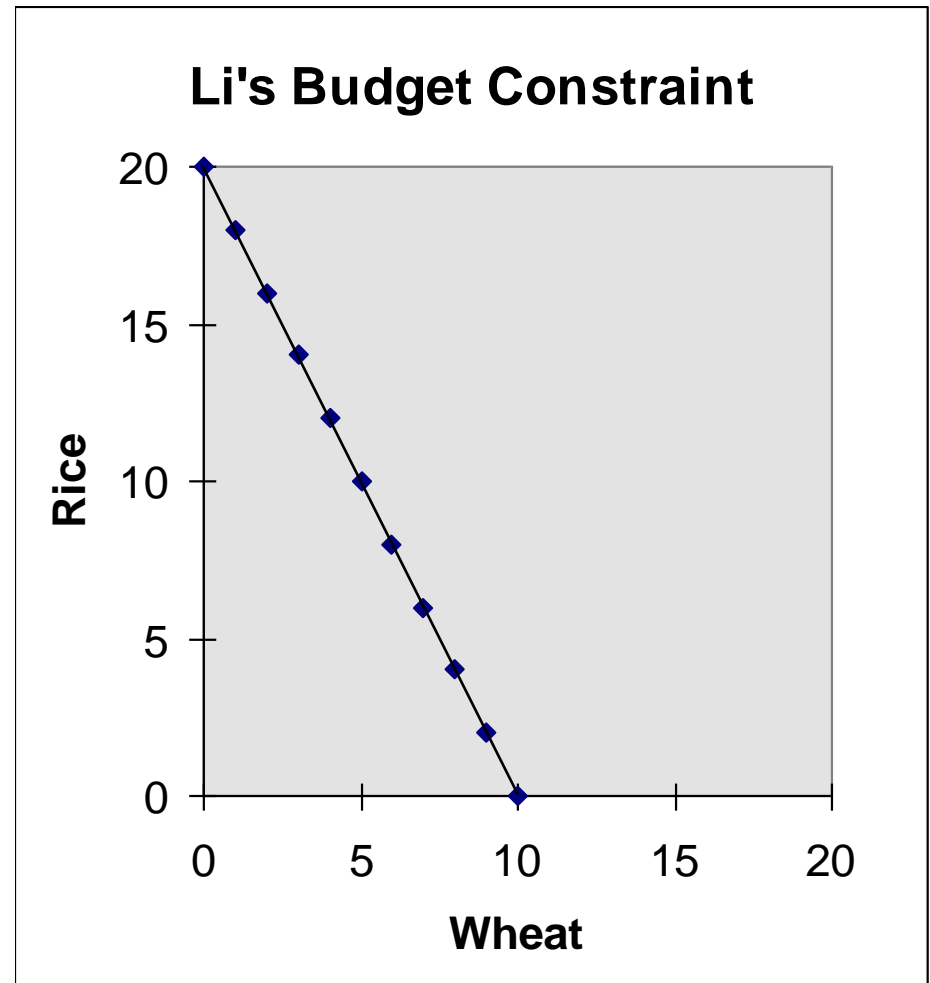
$$I = P_W W + P_R R$$

$$R = I/P_R - (P_W/P_R)W$$

- I like to refer to the |slope| of the budget line as the ERS=Economic Rate of Substitution
- In this case it is  $P_W/P_R$
- For Li:  $P_W=\$4$   $P_R=\$2$   $I=\$40$   $ERS=2$

# Graph of Li's Budget Constraint

- The graph to the right shows a picture of Li's budget constraint.
- ◆ Each blue diamond is a point from the table.
- ◆ The slope is equal to  $-2$ , as shown on the last slide.





# Utility and Preferences

- Utility is the way economists represent preferences.
- Among two bundles, the one with the higher utility is the preferred bundle.
- If two bundles have the same utility, we say that the consumer is indifferent.

# Indifference Curves

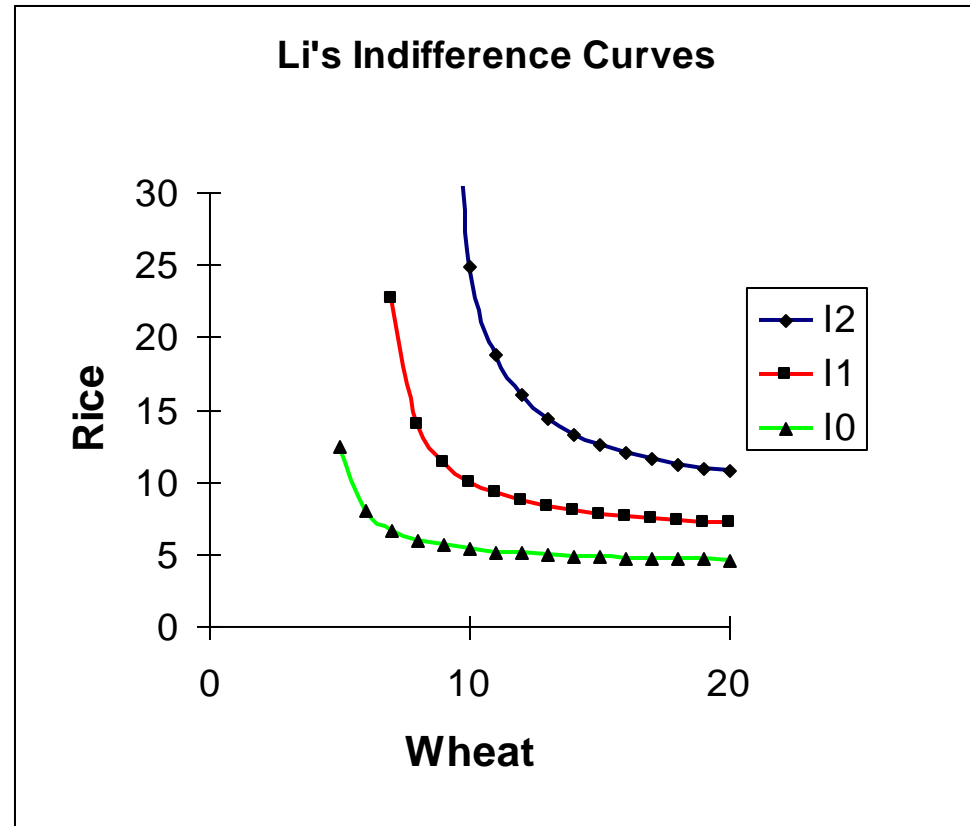
- Preferences that satisfy the conditions I have noted above can be represented by indifference curves.
- The set of all indifference curves that describe an individual's preferences are referred to as an indifference curve map.
- An indifference curve connects all of the bundles that a consumer likes equally.
- We will assume only two goods when using indifference curve analysis.

# Indifference Curve Map - Properties

- An indifference curve should not slope up.
- Indifference curves can not cross one another.
- Better bundles are to the northeast.
- Indifference curves are convex to the origin.

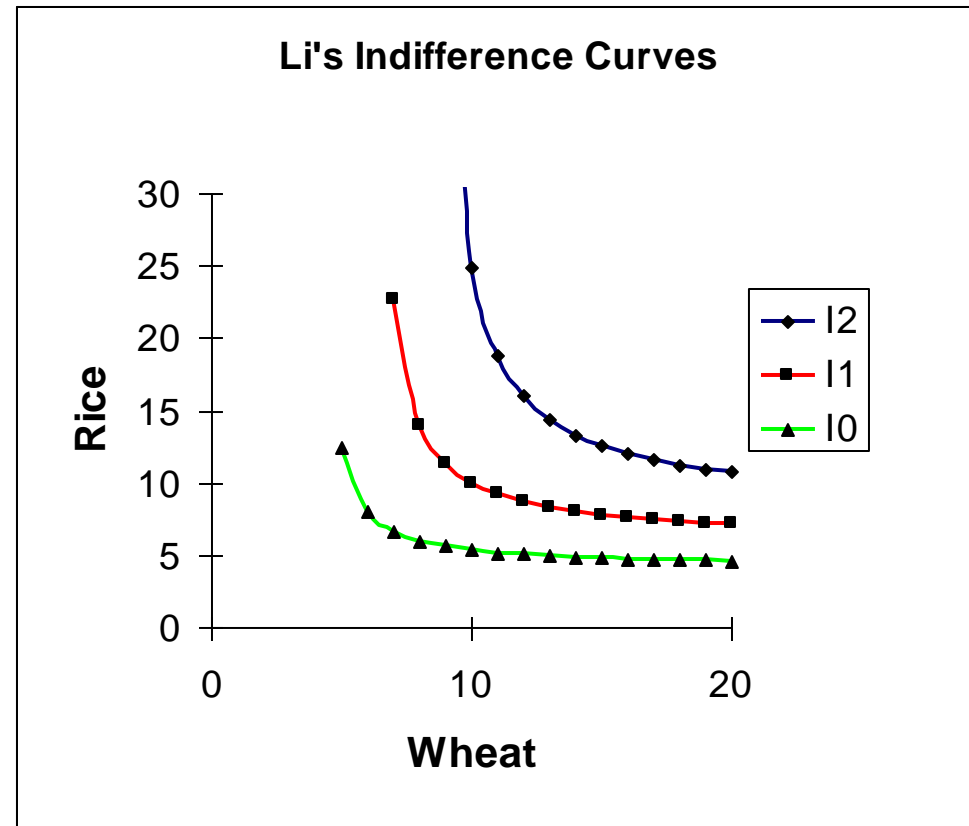
# Li's Preferences in Indifference Curves

- An indifference curve connects all the bundles that have the same utility.
- ◆ Higher indifference curves indicate more utility ( $IC_2$  is preferred to  $IC_1$ ).
- ◆ Lower indifference curves indicate less utility ( $IC_1$  is preferred to  $IC_0$ ).
- ◆ The indifference curve map is FULL of indifference curves.



# The Marginal Rate of Substitution

- The **M**arginal **R**ate of **S**ubstitution(MRS) tells us how much of one good Li would willingly trade for an incremental unit of the other good and remain indifferent.
- The  $MRS = |\text{slope}|$  of the indifference curve at a bundle.
- Common to assume the MRS declines as we move down an indifference curve.

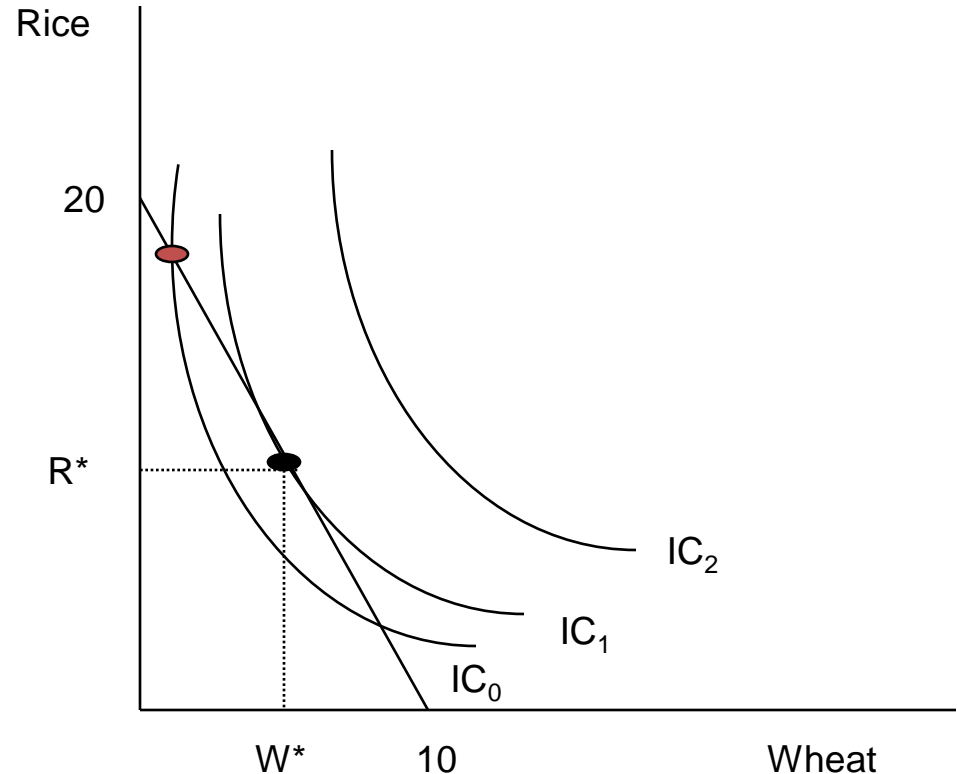


# How Much Wheat and Rice

- Li's optimal amount of wheat and rice to consume is the amount that maximizes Li's utility subject to her budget constraint.
- In the graph...
  - Get to the highest indifference curve possible
  - Stay on the budget constraint (b/c more is better)

# How to Find Li's Best Combination

- The black bundle is best.
- The pink bundle is not the best. Li has spent all her income but is not on the highest indifference curve possible.
- Bundles n/e of  $IC_0$  are better and some are affordable.
- At  $(W^*, R^*)$  she is doing the best she can subject to her budget constraint.



# How to Find the Best Combination

- Utility is maximized when:
  - the indifference curve is just tangent to the budget line.
- Utility is maximized when:
  - you are on the budget line and
  - the slope of the indifference curve equals the slope of the budget line
- Utility is maximized when:
  - $\text{Income} = P_R R + P_W W$
  - $\text{MRS} = \text{ERS}$

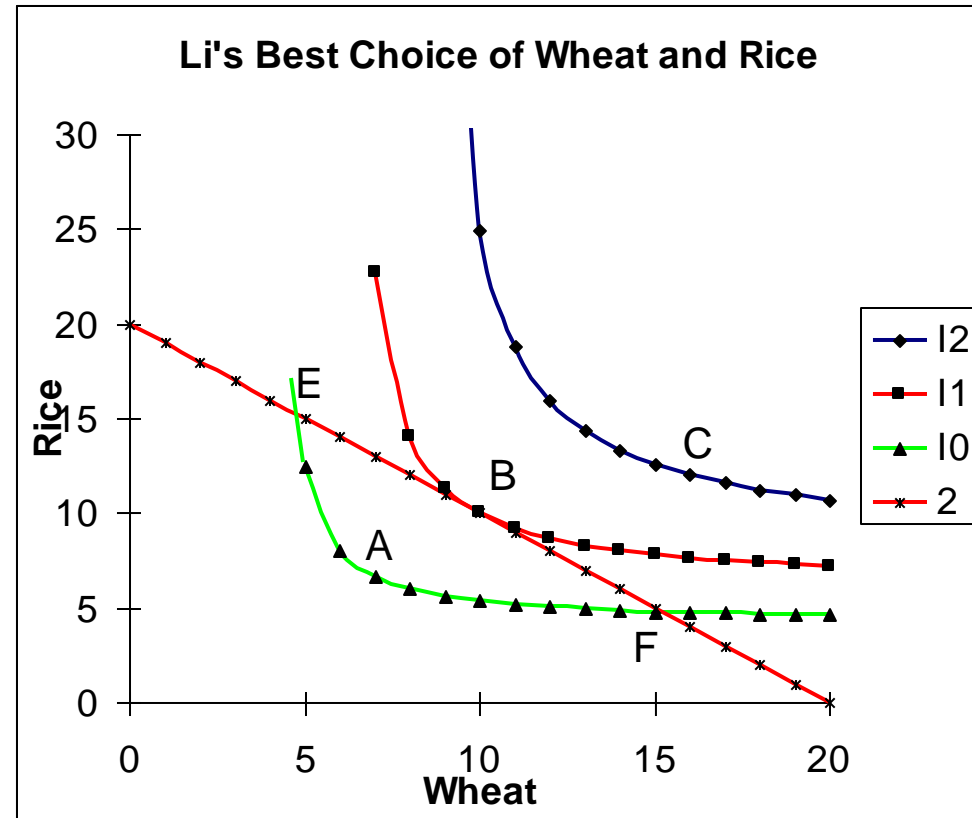


# The “bang per buck” story

- The  $MRS = MU_W / MU_R$
- The  $ERS = P_W / P_R$
- At an optimal bundle:  $MRS=ERS$
- Rewritten we have:
  - $MU_W / MU_R = P_W / P_R$
  - $MU_W / P_W = MU_R / P_R$
  - bang/buck in wheat = bang/buck in rice
- Get same optimal bundle either way

# Li's Best Choice Reconsidered

- Consider the choice at  $P_w = \$2/\text{lb}$ .
- The point B is optimal.
- The point A is feasible but inferior to all points on the red budget line between E and F.
- The point C is preferred to B but cannot be purchased with Li's \$40 income at the given prices; it is above the red budget line.
- The point E is feasible but Li prefers more wheat and less rice (B).
- The point F is feasible but Li prefers less wheat and more rice (B, again).
- There is no combination that Li prefers to B that she is able to buy.



# Application: Effect of a Tax

- Suppose I have the preferences illustrated at the right.

- **Question A:**

If Income = \$16

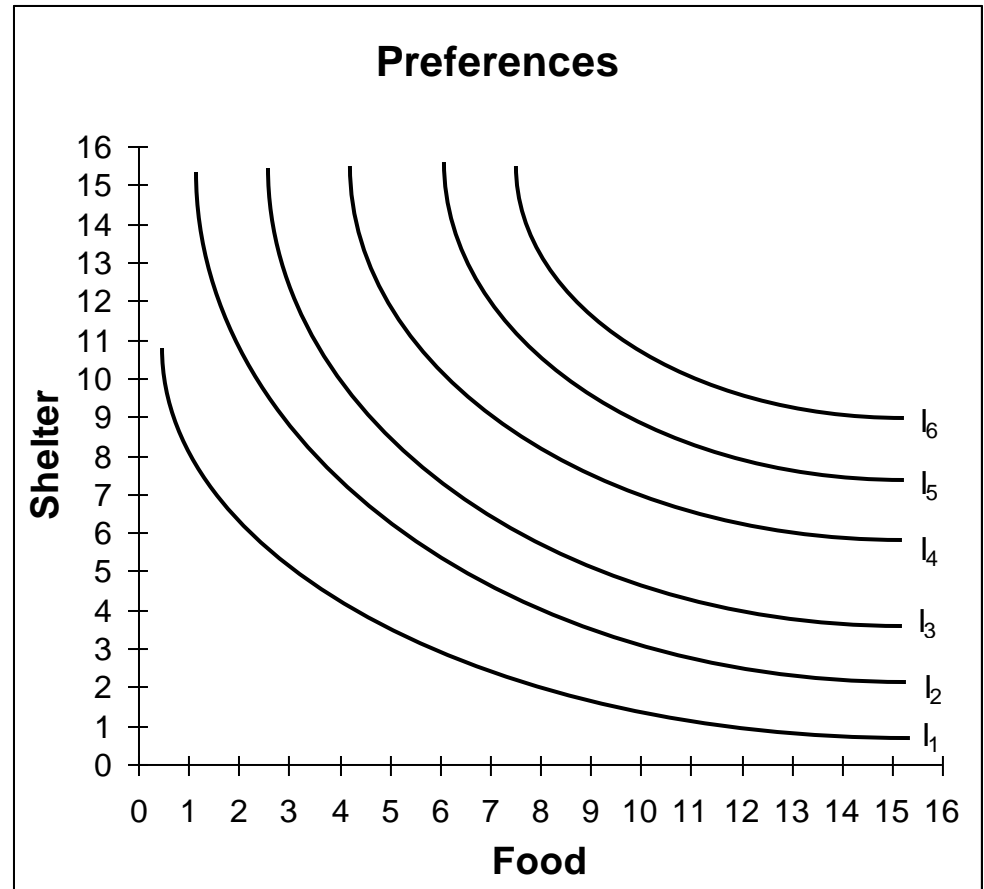
If Price of food = \$1

If Price of shelter = \$1

Food = ?

Shelter = ?

Indifference curve = ?



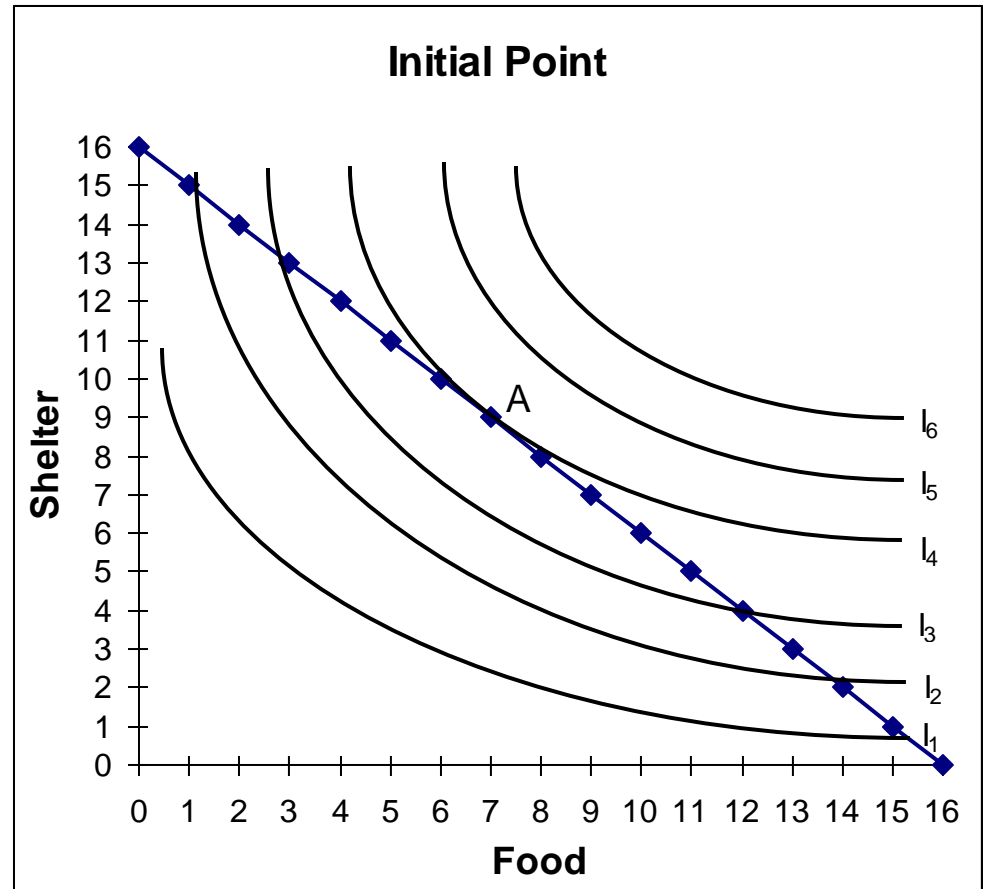
# Answer A

- Point A:  
If Income = \$16  
If Price of food = \$1  
If Price of shelter = \$1

Food = 7

Shelter = 9

Indifference curve =  $I_4$



# Effect of a Tax: Addition of Tax

- Question B:**

If Income = \$16

If Price of food = \$1

If Price of shelter = \$1 and

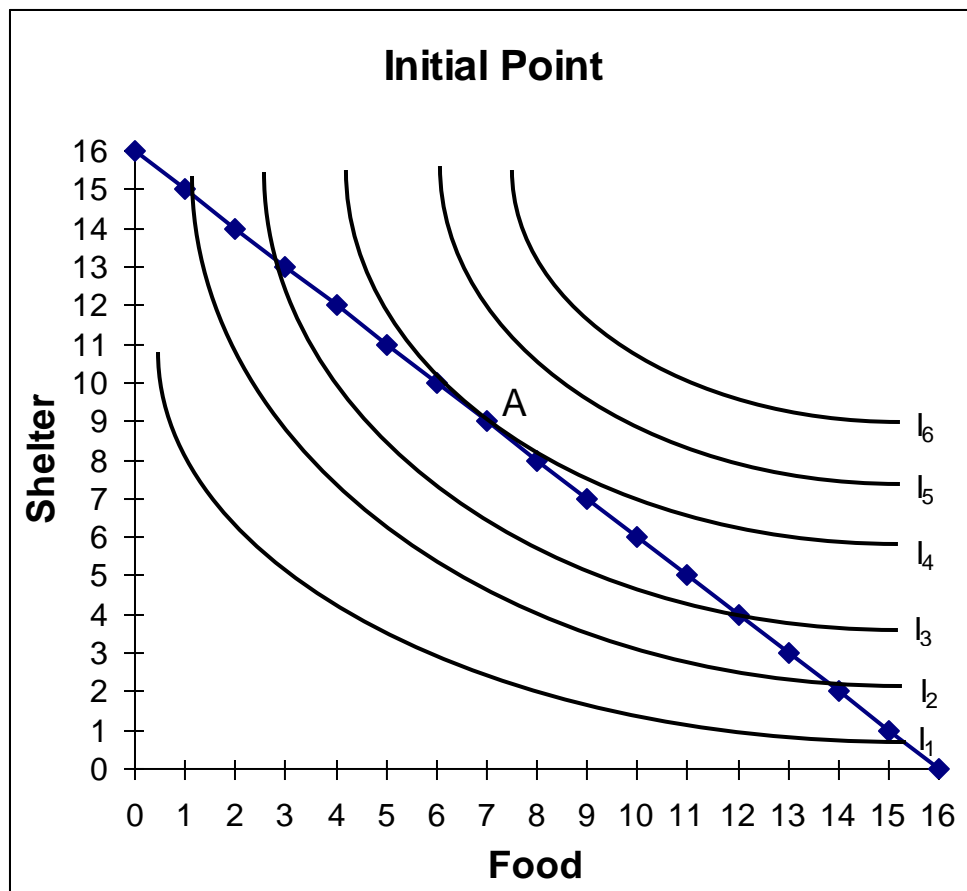
Tax on shelter = 100%

Tax-inclusive price of  
shelter = ?

Food = ?

Shelter = ?

Indifference curve = ?



# Answer B

- Point **B**

If Income = \$16

If Price of food = \$1

If Price of shelter = \$1 and

Tax on shelter = 100%

Tax-inclusive price of  
shelter = **2**

Food = **9**

Shelter = **3.5**

Indifference curve =  $I_2$

