ECNS 204

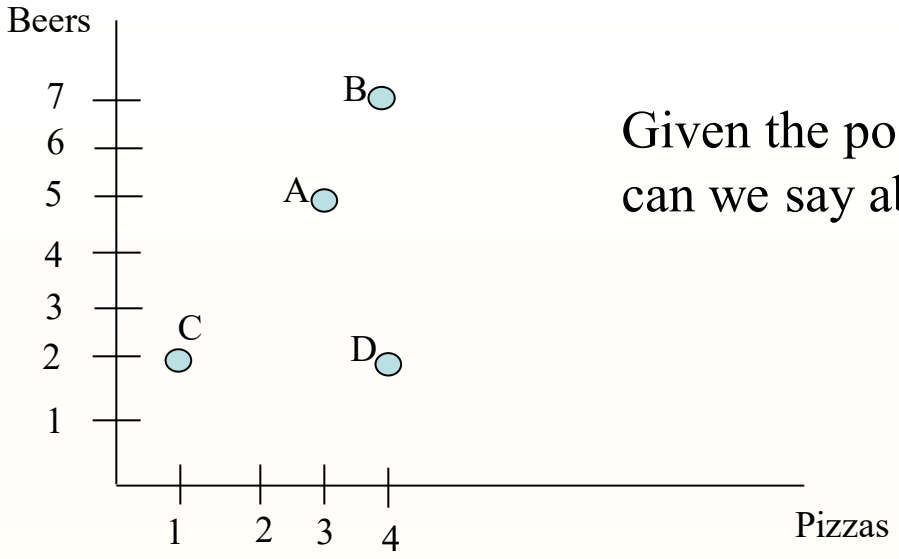
Price Theory and Applications

Chapter 3 (The Behavior of Consumers) – Landsburg

Dr. Mark Anderson

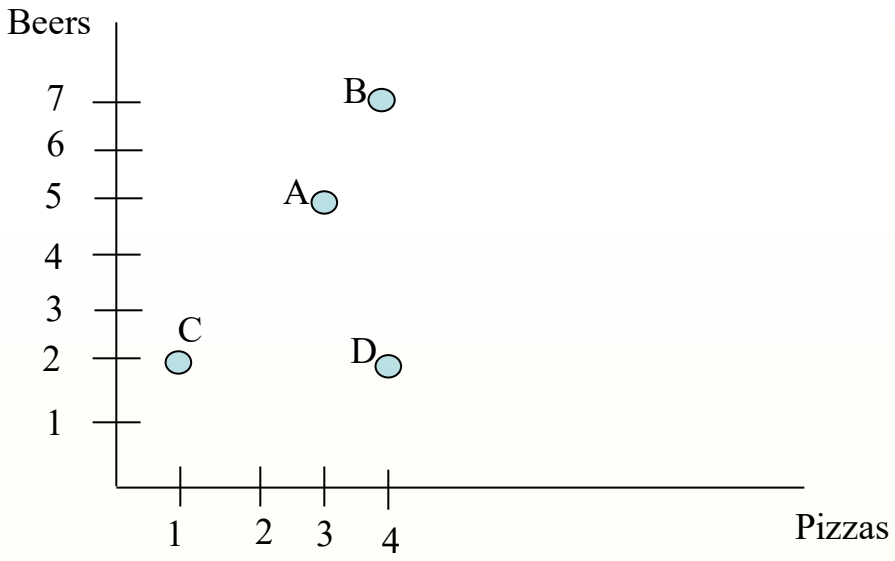
More on the Behavior of Consumers

- We can express the preferences of consumers with ***indifference curves***.
- Suppose we have a consumer who lives in a world with two goods: beer and pizza
- This consumer will have different preferences over combinations of these two items
- For instance, we can ask the consumer whether she would rather own a basket of 3 pizzas and 5 beers or a basket of 4 pizzas and 2 beers
  - We can learn something about preferences given the answer to this question
- Let's consider the graph on the following page…



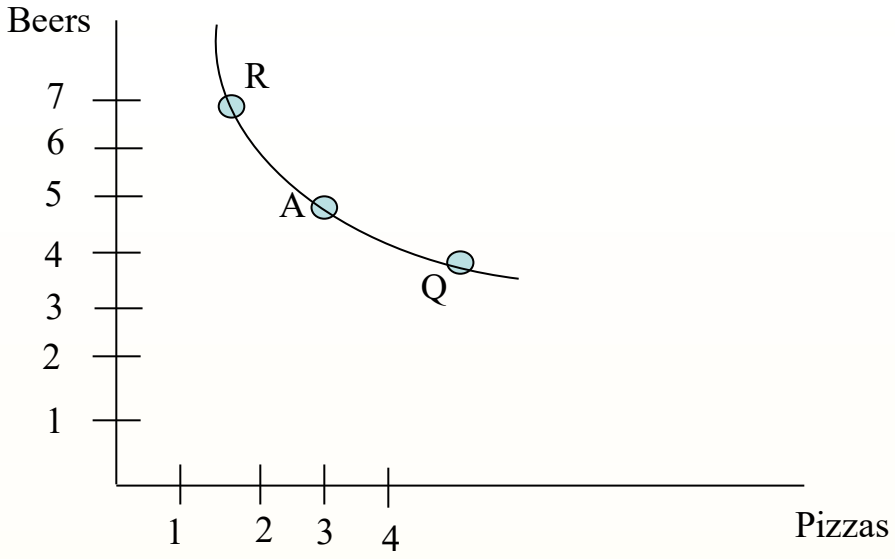
Given the possible bundles A, B, C and D, what can we say about her preferences?

- If we assume both items are "goods", then we know that B is preferred to A and is also preferred to C…b/c the basket of goods at B contains more beer *and* pizza than either point A or C.
- We also know that A is preferred to C for a similar reason. It contains both more beer and pizza.
- B is preferred to D. Same number of pizzas, but more beer
- D is preferred to C. Same number of beers, but more pizza

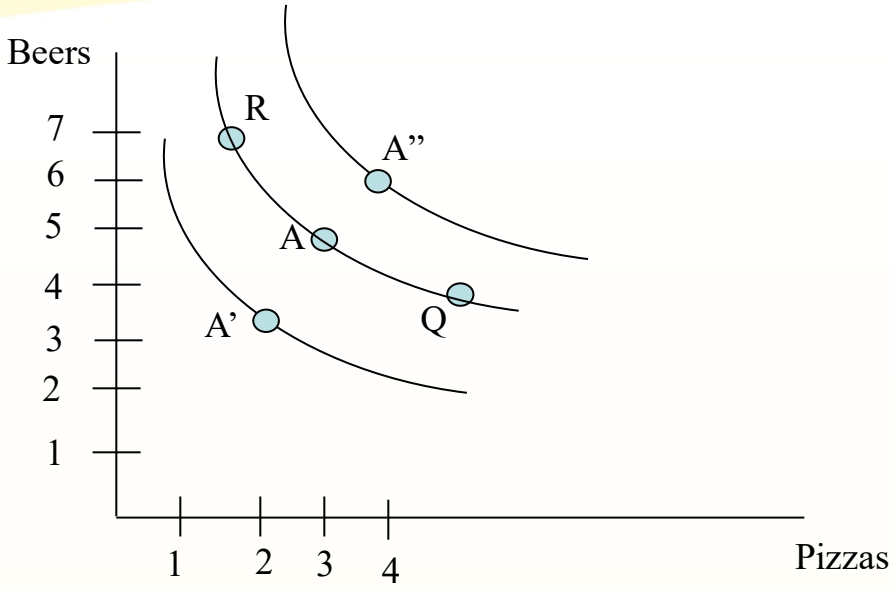


- Which comparison, however, is ambiguous?
  - We do not know if she prefers A to D or vice versa.

- Where should we look to find bundles that she likes *exactly* as much as A?
  - Can't be to the northeast (e.g., B)
  - Can't be to the southwest (e.g., C)
  - Must either be to the northwest or the southeast (e.g., she could be indifferent b/w A and D)



- If we were to draw a few of the bundles that that the consumer likes just as much as bundle A, they might look like Q and R.
- The line drawn between these 3 points is called an indifference curve (IC). The consumer is indifferent b/w all bundles of goods that lie on the same IC.



- Furthermore, there is nothing special about bundle A. We could have drawn the same thing for A’ or A”

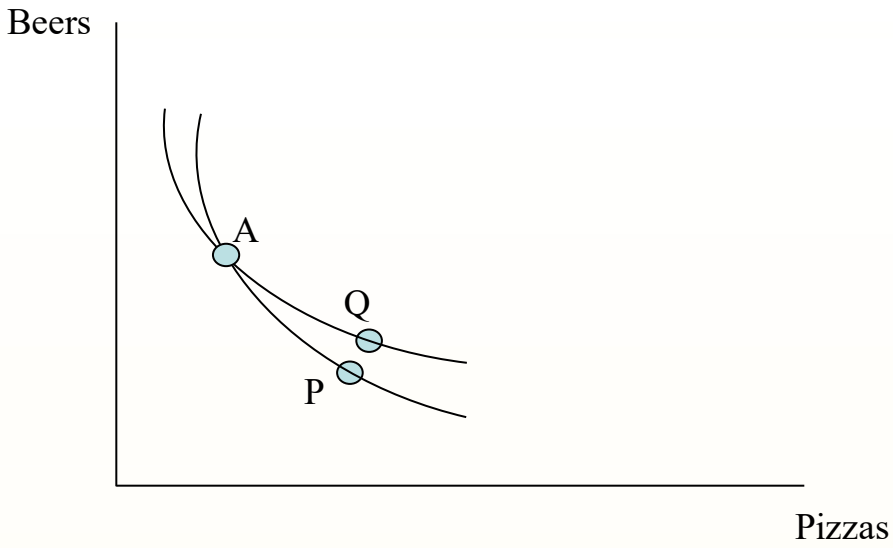
About Indifference Curves

- ICs do not have to have the same shape, but they must slope downward.

- If we know a consumer's indifference curves, we can make inferences about the consumer's behavior.
  - For instance, we know she is indifferent b/w bundles A and Q on the previous slide.
  - We also know she prefers A" to A
    - Because of this, we may infer that A" is also preferred to Q and R
  - Of course, the consumer has more than 3 ICs…they fill the entire plane.

- One very important feature of ICs is that the ***never cross.***

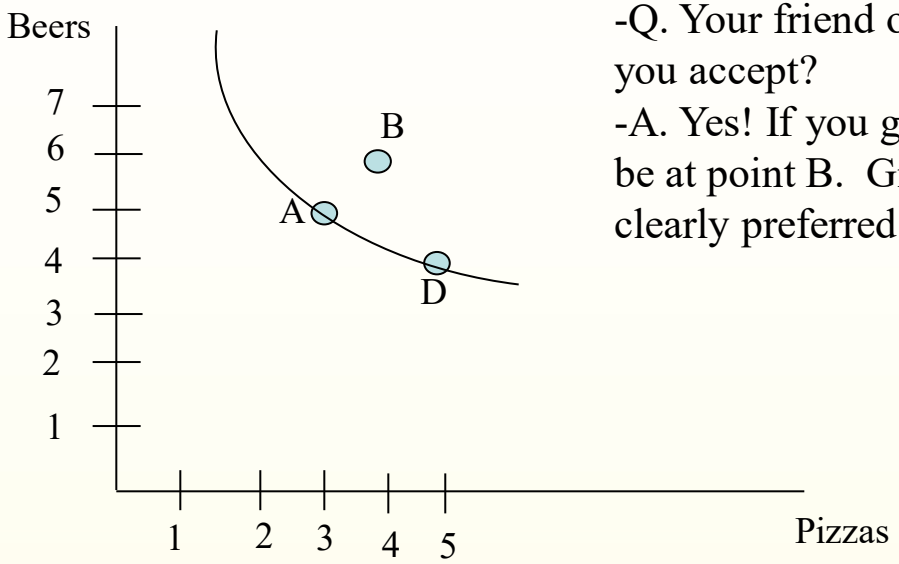
- Consider the graph on the following page…



- Because A and Q are on the same IC, the consumer is indifferent b/w these two bundles
- Because A and P are on the same IC, the consumer is indifferent b/w these two bundles
- Therefore, the consumer should also be indifferent b/w Q and P.
- But, this is not the case. Because Q contains more beer *and* pizza, the consumer clearly prefers Q to P. There is a logical inconsistency if ICs cross.
  - ***NEVER DRAW CROSSING ICs!!!!***

Marginal Values

- Here, we interpret the slope of ICs
- First, we want to understand how ICs can tell us whether certain trades are desirable
- Consider the following…



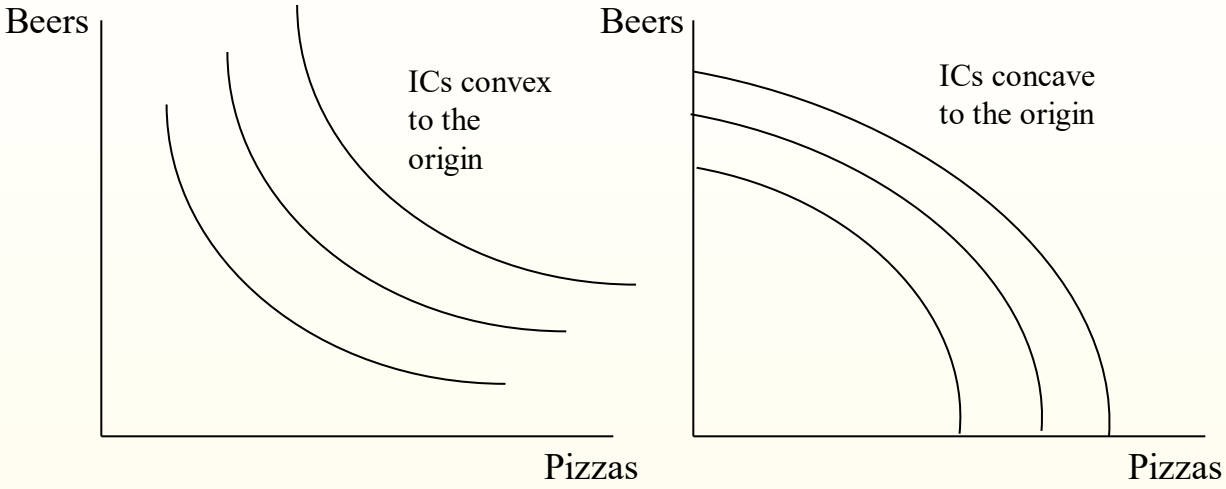
-Suppose you have 5 pizzas and 4 beers (i.e., pt. D)
-Q. Your friend offers you 2 beers for 1 pizza. Do you accept?
-A. Yes! If you give up 1 pizza for 2 beers, you will be at point B. Given the IC drawn here, point B is clearly preferred to all points on the IC.

Another example: https://montana.techsmithrelay.com/B3YO
MV as a slope: https://montana.techsmithrelay.com/wLhL

-If the offer had been 1 beer for 2 pizzas, you would have been indifferent (b/c that would put you at point A).

Shape of ICs

- A starving person with a refrigerator full of beer is likely to value a pizza more highly (in terms of beer) than a thirsty person with a refrigerator full of pizza.
  - General geometric rule:
    - We expect ICs to be steep near baskets containing few pizzas and many beers
    - We expect ICs to be shallow near baskets containing many pizzas and few beers
- Consider the following two examples:



- In 2nd graph, consumer values pizzas highly when she has many pizzas and few beers (inconsistent with the law of diminishing MVs), but values pizzas much less when she has few pizzas and many beers
  - While such tastes are theoretically possible, they seem highly unlikely.
  - Hence, we assume ICs are convex to the origin

Summarizing up to this point

- ICs
  - Slope downward
  - Fill the plane
  - Never cross!
  - Are convex to the origin

The Budget Line and the Consumer's Choice

- Continue to assume we live in a world with two goods: X and Y
- Q. In order to determine which baskets our consumer can afford, what do we need to know?
- Ans. We need to know the following:
  - Price of good x: P_x
  - Price of good y: P_y
  - Consumer's income: I
- Let's suppose the consumer is considering the purchase of a particular basket
  - The basket contains x units of X and y units of Y (where lower-case letters represent quantities)
- Q. How much will it cost the consumer to acquire this basket?
  - Ans. $P_x x + P_y y$
- Q. Under what circumstances can the consumer afford to acquire this basket?
- Ans. He can acquire basket only if $P_x x + P_y y \leq I$.

The Budget Line and the Consumer's Choice

- If we take seriously the assumption that we live in a 2-good world, then all of the consumer's income will be used on X and Y:

$$P_x x + P_y y = I$$

- We refer to this as the consumer's ***budget line*** (aka "budget constraint)
- We can rewrite this equation as:

$$P_x x/P_y + y = I/P_y$$

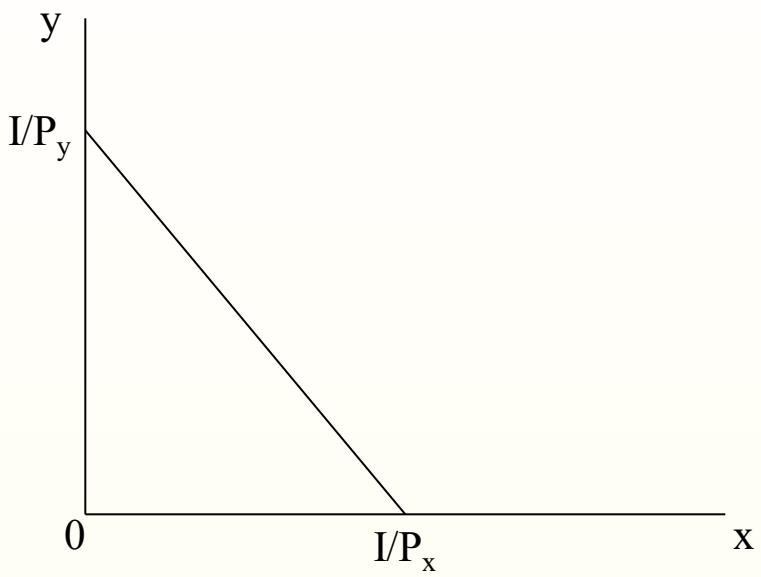
$$\rightarrow y = -P_x x/P_y + I/P_y$$

(note: prices and income in this equation are constant, whereas x and y are variables)

- This represents an equation of a line with slope equal to $-P_x/P_y$ and a y-intercept equal to I/P_y

The Budget Line and the Consumer's Choice

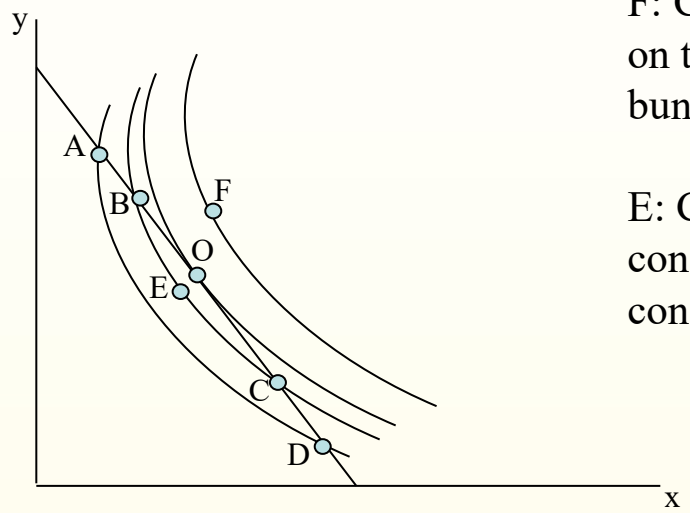
- Graphically, we can show the budget line as



- Things to note about the geometry of the budget line:
  - Slope is equal to $-P_x/P_y$ and the ratio P_x/P_y is the relative price of X in terms of Y.
  - Budget line will be steep when X is expensive relative to Y, and it will be shallow when X is inexpensive relative to Y.

The Consumer's Choice

- ICs reflect the consumer's preferences without regard to what the consumer can actually buy
- The budget line shows which baskets the consumer can afford to buy without regard to preferences.
- To determine how consumer will actually behave, we must combine the two concepts
- Consider the following



F: Clearly this bundle is preferred to all others b/c it is on the highest IC…but, the consumer cannot afford this bundle as it lies outside of the budget line

E: Clearly, the consumer can afford this bundle, but the consumer can do better…point E does not exhaust the consumer's income as it lies inside of the budget line

The Consumer's Choice

- The baskets the consumer can acquire are the ones on the budget line:

  A, B, O, C and D

- Which bundle will be chosen?
  - Given the consumer's preferences, the one that places him on the highest IC will be chosen…so, he will end up choosing to consume at point O.
  - *The basket the consumer chooses will always be located where his budget line is tangent to one of his ICs*
    - This basket is the consumer's ***optimum***.
- We can think of this process in a different, and perhaps more intuitive, manner:
  - Suppose the consumer owns basket A. How much Y would he be willing to give up for one more unit of X?
  - The answer is given by the MV of a unit of X, which is just the absolute value of the slope of his IC at point A.
  - But, how much Y would the consumer actually have to sacrifice to acquire one more unit of X?
  - The answer is simply given by the relative price of X in terms of Y:
    - Which is P_x/P_y or just the absolute value of the slope of the budget line.

The Consumer's Choice

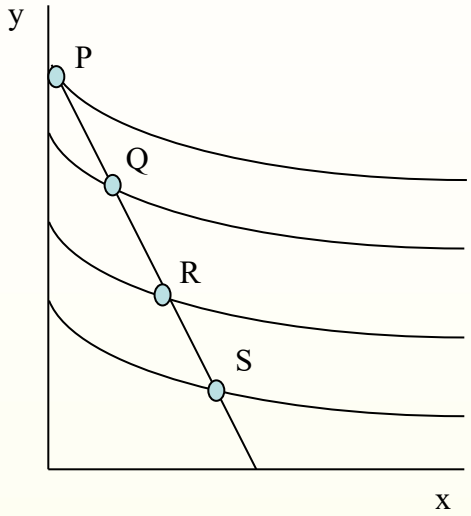
- At point A, the IC is steeper than the budget line
  - The amount of Y the consumer is willing to pay for one more unit of X exceeds the amount of Y he actually has to give up for a unit of X.
  - In this scenario, the consumer is made better off by obtaining one more unit of X.
  - A similar argument applies for point B.

Whenever the MV of X > relative price of X, the consumer will want to buy more X, and move down the budget line.

- At point D, MV of X < relative price of X
  - Thus, he will happily trade away a unite of X for more Ys.
  - Process stopes when MV of X = relative price of X
    - Which is at point O

Corner Solutions

- An exception to the rule that the consumer's optimum always occurs at a tangency.
- Consider the case where there is no tangency to choose



- Using simple geometry, we know the consumer must choose a basket on his budget line…so bundle P is chose as it is on the highest IC
- Same logic applies as before as to why the consumer does not choose, say, the bundle S
  - The MV of X < relative price of X…so consumer does better by giving up a unite of X for more Y.
  - This logic applies to all points on the budget line
  - Thus, the optimal solution is to use all income on Y and none on X.

Applications of ICs

Standards of Living

- Economic conditions change all of the time
  - Incomes fluctuate
  - Prices fluctuate
- Some issues are easy to understand
  - For example, if a consumer's income remains fixed and all prices of goods she consumes rise, then she is worse off than before.
- But, what if some prices rise and others fall? Here, it is not as easy to figure out whether the consumer is better or worse off.
- Working through standards of living problem: https://montana.techsmithrelay.com/U8IY

Applications of ICs

Comparing Two Tax Schemes

- Which would you rather pay?
  - A percentage income tax (where the government takes a certain percent of your earnings)
  - A head tax (where government takes a certain number of dollars every day, regardless of your income)
  - Clearly, the answer depends, in part, on the size of the taxes…so, let's assume each tax costs you the same amount
- Ex. Suppose you earn $10/hr. and work 10 hrs./day under a 50% income tax
- Suppose the government is considering replacing the income tax with a simple $50/day head tax
- Q. Which do you prefer? The income tax or the head tax?
  - To answer this, we need to modify how we think about the budget line.
  - Tax problem (part 1): https://montana.techsmithrelay.com/oWQh
  - Tax problem (part 2): https://montana.techsmithrelay.com/m5YF

Applications of ICs

- We have shown in the video clips that the consumer prefers the head tax…it lands the consumer on a higher IC. But, what is the intuition?
  - Consider point P (i.e., the point of tangency b/w the IC and BC under the income tax scheme).
    - What is the MV of leisure here?
    - Because the IC is tangent to the BC at this point, the MV of leisure is equal to the slope of the BC at point P, which is simply MV = $5.
    - This means that if you forgo that last hour of leisure and choose to work one more hour, you will take home $5 in wages, gaining nothing.
  - However, if the income tax were abolished and replaced by a head tax, you now have the opportunity to forgo one hour of leisure for $10 in wages
    - This is an attractive opportunity!
    - By accepting it, you move up and to the left along the head tax budget constraint until reaching the point where your MV of leisure is exactly $10/hour (i.e., the point where we drew the tangency b/w the IC and the head tax budget line)

Applications of ICs

- Practice Problem #1: https://montana.techsmithrelay.com/AQNz
- Practice Problem #2: https://montana.techsmithrelay.com/clmO