

# The Worker's Dilemma

EC 350: Labor Economics

Kyle Raze

Spring 2021

## Discussion

**Q<sub>1</sub>:** What is the research question?

**Q<sub>2</sub>:** What data does the study bring to bear?

**Q<sub>3</sub>:** What does the study find?

**Q<sub>4</sub>:** Should we believe the findings? Why or why not?

**Q<sub>5</sub>:** What are the policy implications?

# The Worker's Dilemma

# The Worker's Dilemma

**Q:** Why do we work?

**A<sub>1</sub>:** In pursuit of meaning? For enjoyment? To feel useful?

- Some jobs provide more than compensation.
- Other jobs? **Not so much.**

**A<sub>2</sub>:** To make money for purchasing goods and services!

- The bills aren't going to pay themselves!

# The Worker's Dilemma

**Q:** What do we give up by working?

**A:** Time spent doing leisurely<sup>†</sup> activities!

- Sitting on the couch
- Going on vacation
- Spending quality time with your friends and family
- Exercising
- Raising children
- Studying
- Eating
- Sleeping
- Cleaning your apartment
- "Hiking the Appalachian Trail"

<sup>†</sup> In economics, **leisure** = any activity that **doesn't involve working for money** or other remuneration.

# The Worker's Dilemma

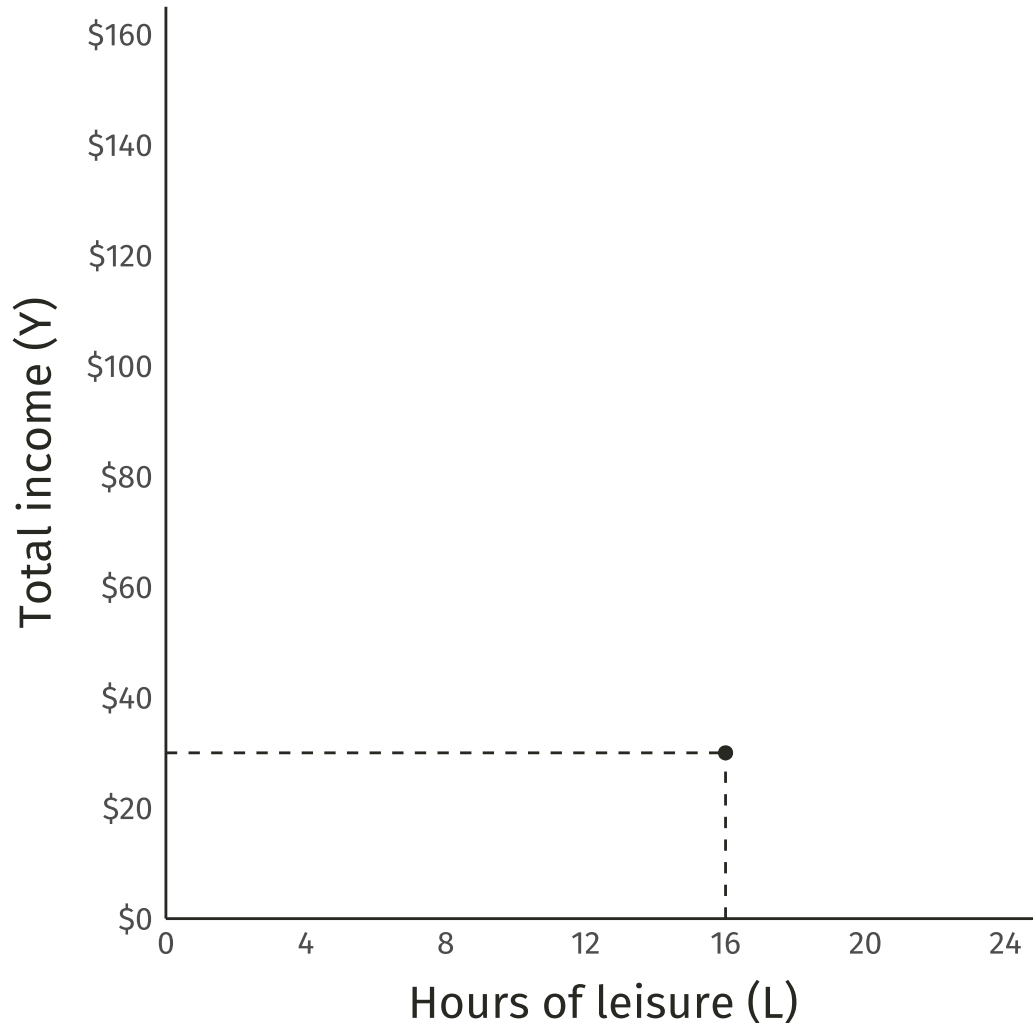
**Q:** Why must we make choices about spending our time and money?

**A: Scarcity!**

- **Time is scarce:** There are only 24 hours in a day, and even though human lifespans are increasing, we still must grapple with our **finite** existence.
- **Resources are scarce:** While living standards are increasing, there still **isn't enough** of the things we like to satisfy our unlimited desires.

When resources are scarce, the decision **to do one thing** necessarily implies that **something else doesn't get done**.

# Choices



An individual worker's choices are characterized by **observable quantities**:

- Daily earnings, or total income
- Daily hours worked  $\rightarrow$  hours of leisure

Typically, these quantities are all we can see in the data.

- To understand *how* workers make choices, **we need a theory!**

# Labor-leisure model

**Q:** How do workers make **labor supply** decisions?

- What factors induce individuals to enter the labor market?
- What factors influence *how much* individuals work once they are in the market?

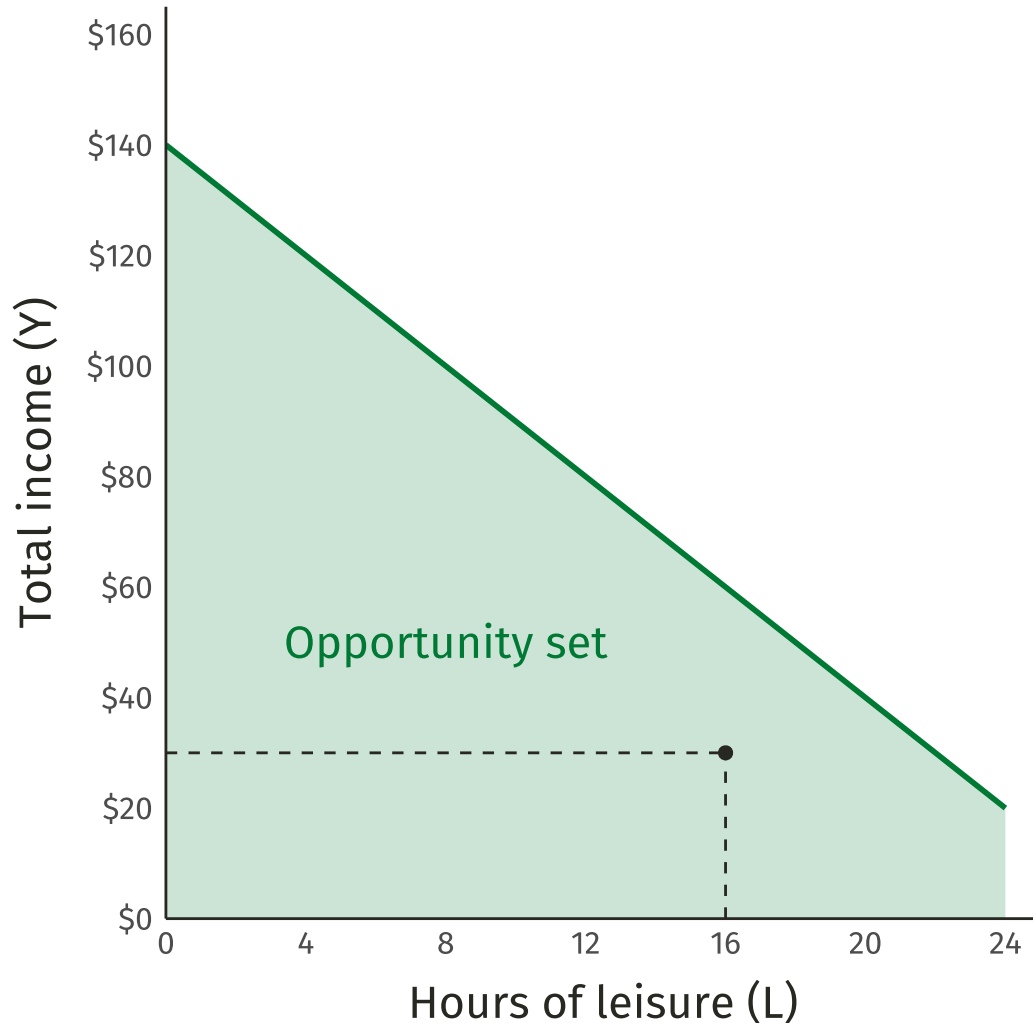
The **labor-leisure model**<sup>†</sup> examines how workers respond to incentives given information about their ***opportunities*** and their ***preferences***.

- The model allows us to generate **testable predictions** about individual responses to changes in market conditions.

<sup>†</sup> Developed by Gary Becker, an influential economist, in *A Theory of the Allocation of Time*, *The Economic Journal* (1965).



# Opportunities



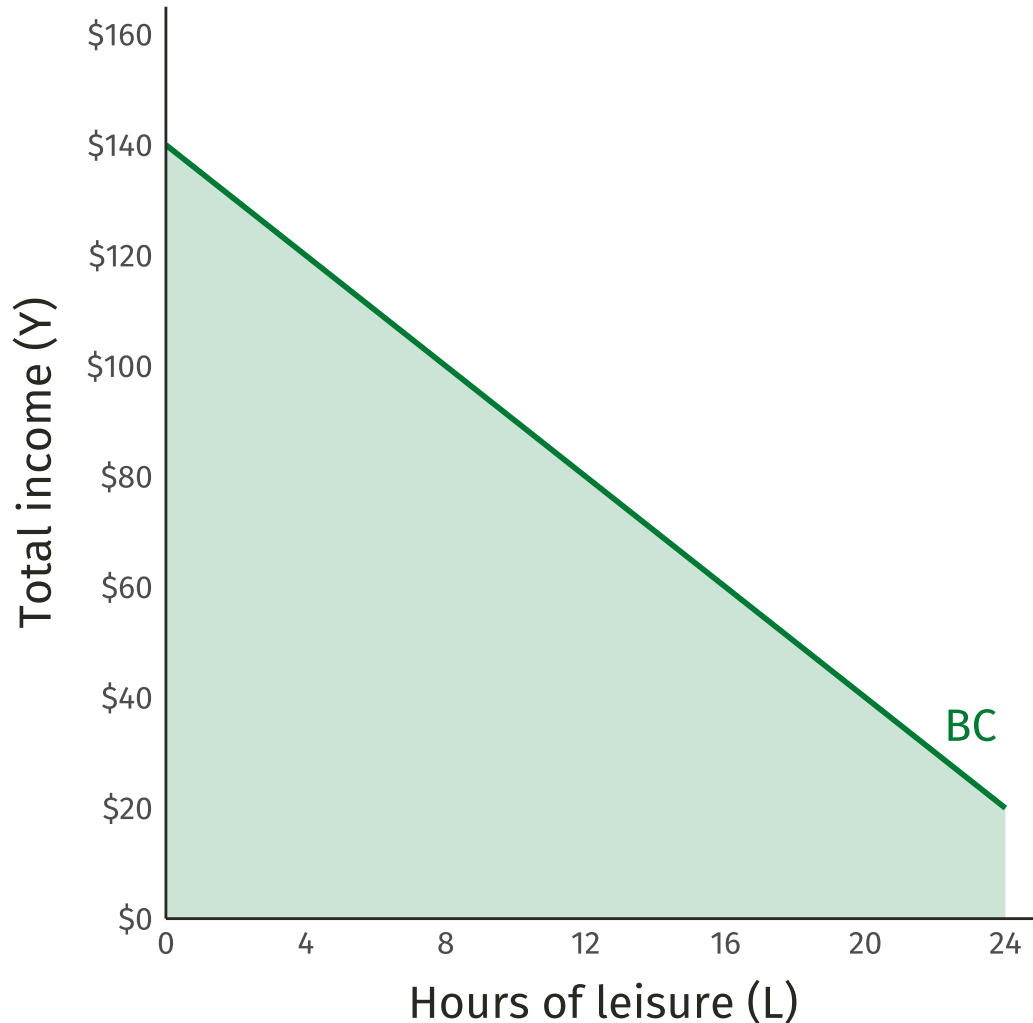
From before, we saw that the worker selected the bundle  $(L = 16, Y = 30)$ .

- It must have been the case that the bundle was **feasible** for the worker.

## Opportunity set

The set of all possible  $(L, Y)$  bundles available to a worker.

# Opportunities



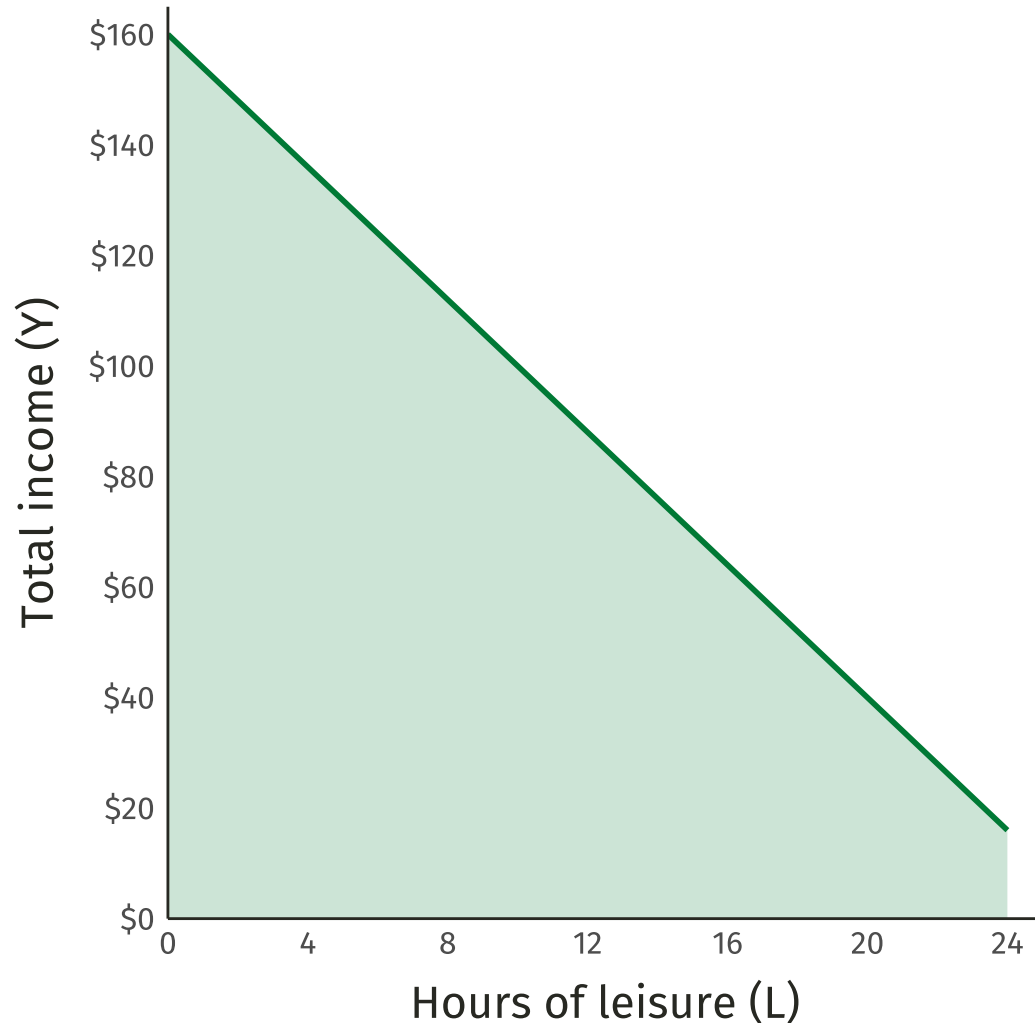
**Q:** What determines a worker's opportunity set?

**A:** The number of hours in a day and the **budget constraint**, given by

$$\begin{aligned} Y &= wH + v \\ &= w(24 - L) + v \end{aligned}$$

- $H$  = number of hours worked
- $w$  = best hourly wage available to the worker
- $v$  = non-labor income

# Opportunities



**Q:** What determines a worker's opportunity set?

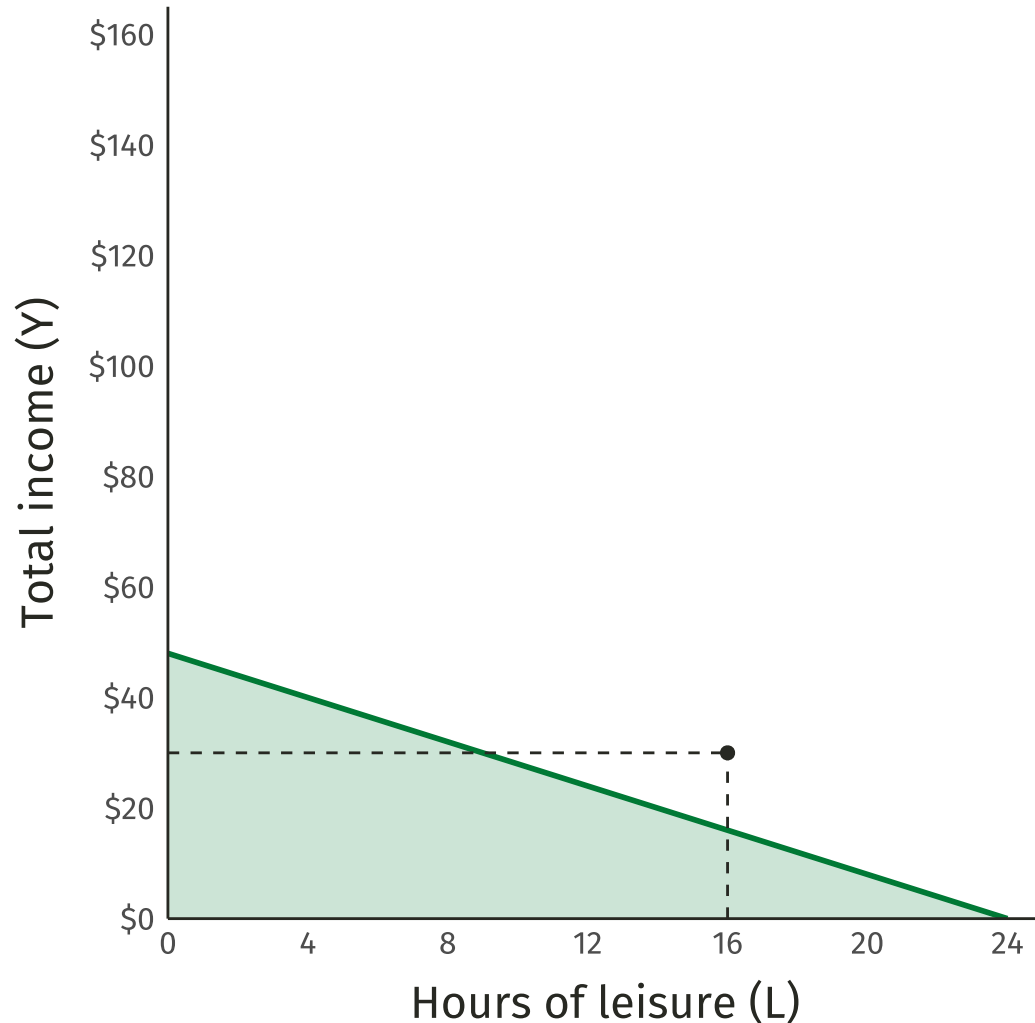
**A:** The number of hours in a day and the **budget constraint**, given by

$$\begin{aligned} Y &= wH + v \\ &= w(24 - L) + v \end{aligned}$$

## Example

- $w = 6$
- $v = 15$

# Opportunities



**Q:** How will the worker respond if her previous choice is no longer feasible?

**A:** 🙋

- To predict a worker's response to a change in her opportunity set, we also must consider her **preferences** over available alternatives.

# Preferences

**Q:** Can we measure preferences?

- **A:** Not typically.

Our inability to measure preferences requires us to make assumptions.

- However defined, **preferences do not change** during the course of the analysis.

**Four behavioral postulates** give us the ability to model labor supply:

1. People have preferences
2. People prefer more over less
3. People are willing to substitute
4. Marginal utility is decreasing

# Preferences

## Utility function

We can describe a worker's preferences over leisure and consumption using a utility function:

$$U = f(L, Y)$$

- $U$  represents the worker's **well-being** or life satisfaction (higher is better).
- $L$  represents hours of leisure, a "good."
- $Y$  represents total (real) income, which we assume will be spent on goods and services.
- The functional form of  $f(\cdot)$  satisfies the four behavioral postulates.

**Q:** The worker only cares about leisure and consumption? Really?

**A:** There are many things we could include in the utility function, but to make testable predictions, **we need to abstract away from unnecessary details.**

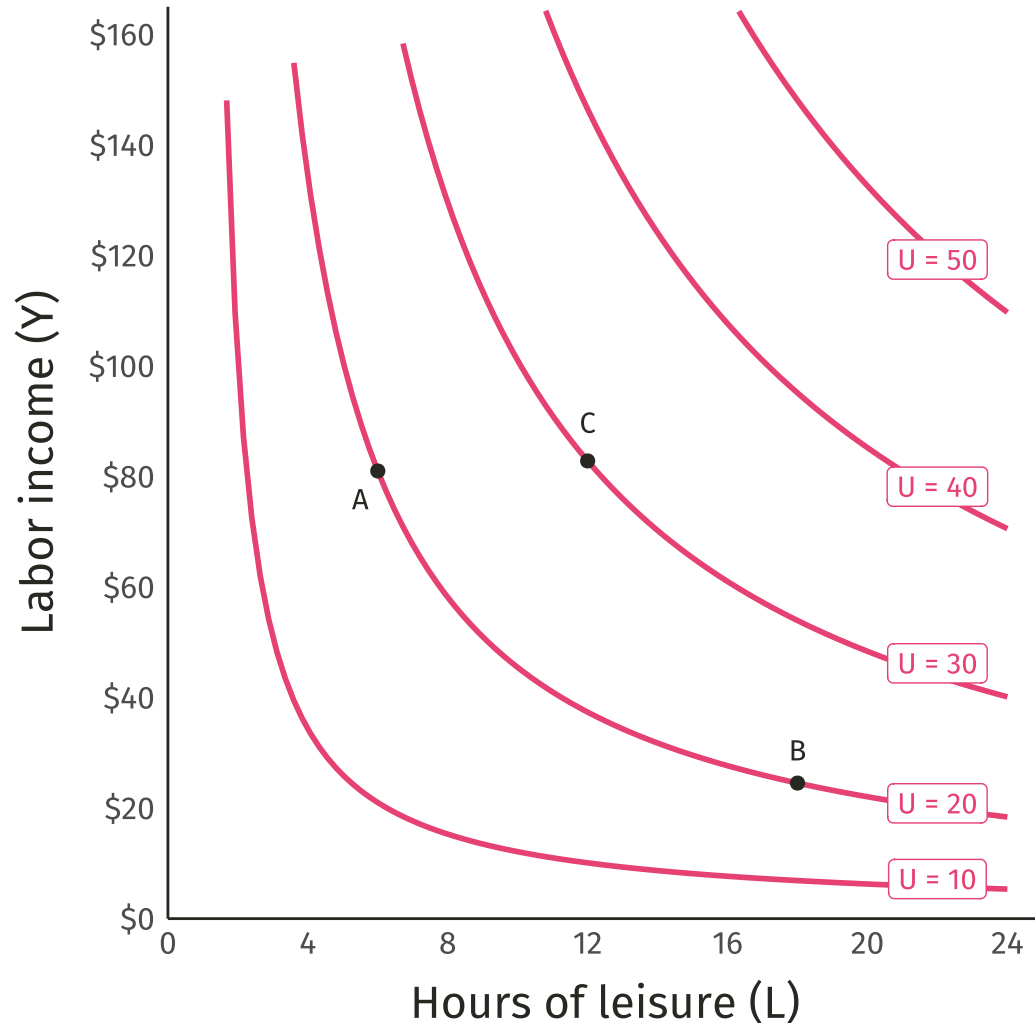
| A theory that explains everything, explains nothing. — Karl Popper

# Preferences

**Q:** How does this **utility function** incorporate the four behavioral postulates?

1. People have preferences?
2. People prefer more over less?
3. People are willing to substitute?
4. Marginal utility is decreasing?

# Preferences



## Indifference curves

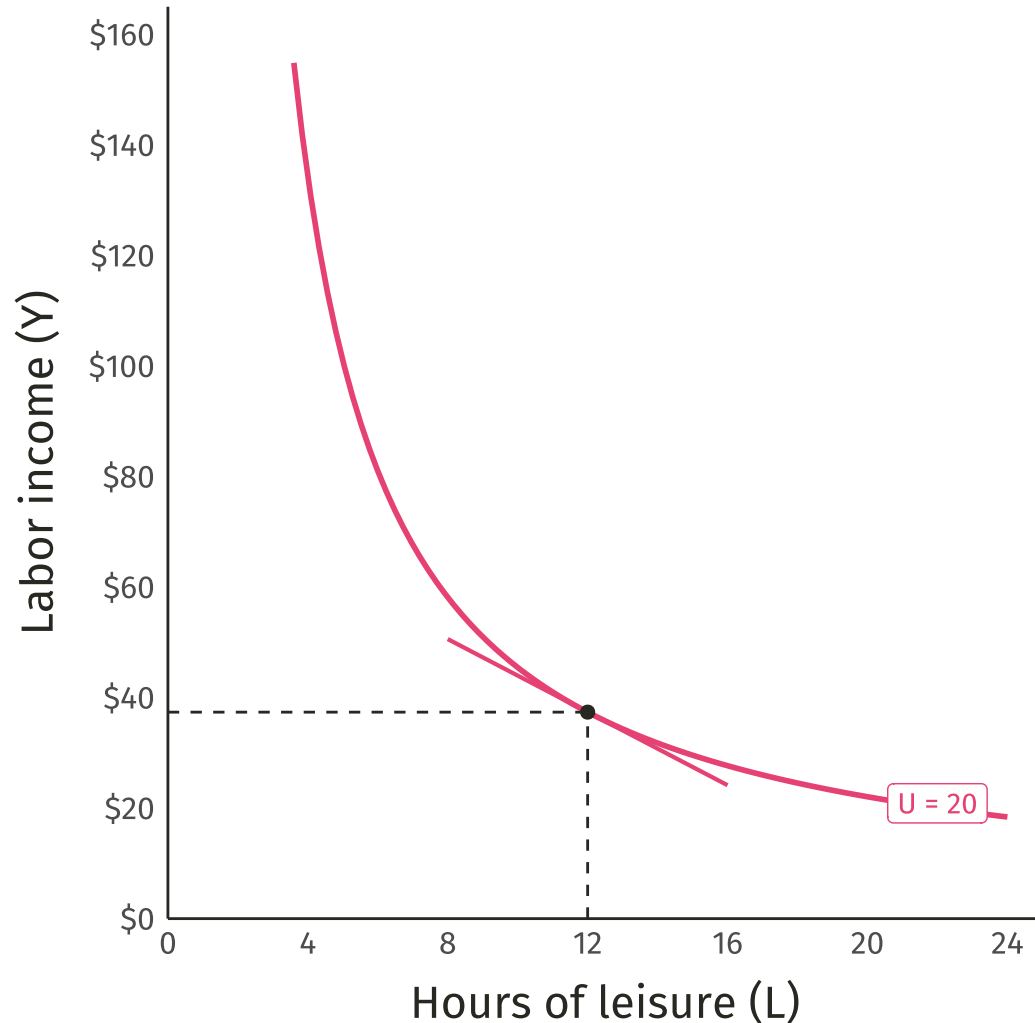
Each **indifference** curve describes the set of  $(L, Y)$ -bundles that yield the **same level of utility**.

- The worker is indifferent between bundle **A** and bundle **B**.
- The worker prefers bundle **C** over **A** or **B**.

The **indifference map** informs us about **what is desirable** from the perspective of the worker.



# Preferences



## Marginal rate of substitution

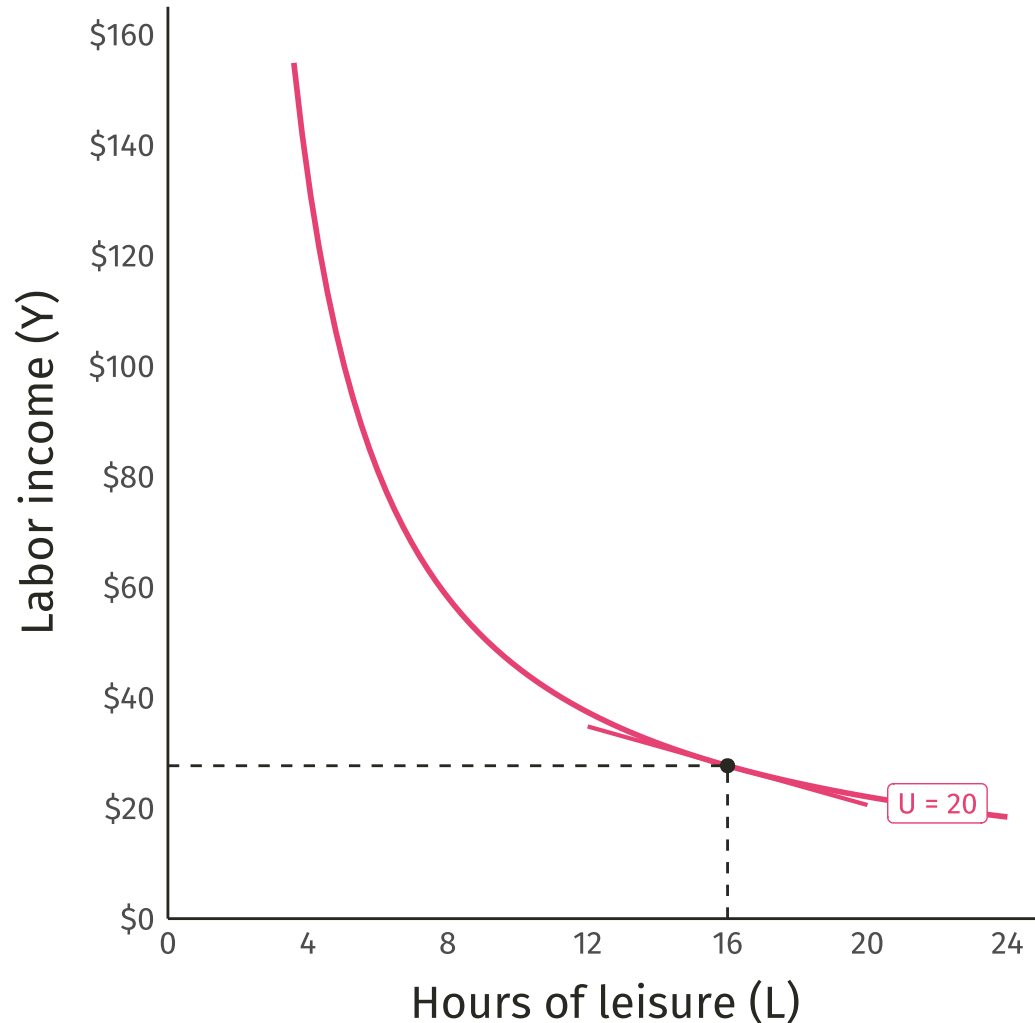
The slope of an indifference curve describes the **marginal rate of substitution of leisure for income**:

$$\text{MRS}_{L,Y} = -\frac{\text{MU}_L}{\text{MU}_Y}$$

- $\text{MU}_L$  = marginal utility of leisure
- $\text{MU}_Y$  = marginal utility of income

**Interpretation:** The amount of income a worker would *willingly* sacrifice for an additional hour of leisure.

# Preferences



## Diminishing marginal rate of substitution

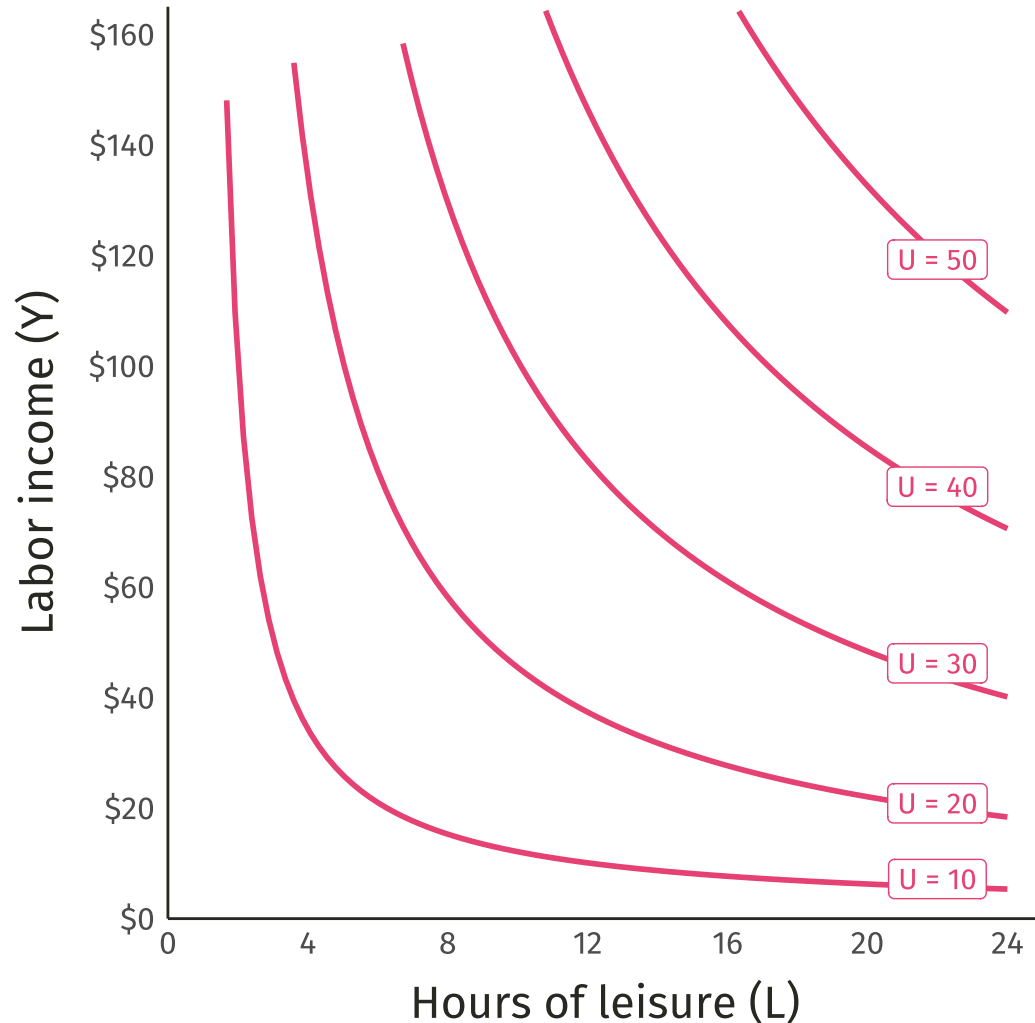
The worker becomes less willing to sacrifice income for leisure as income decreases.

- As  $Y$  decreases relative to  $L$ ,  $|\text{MRS}_{L,Y}|$  decreases.

**Why?** Indifference curves are **convex**.

- An average of two extreme bundles is preferable to either of the extreme bundles.

# Preferences



## Indifference curve properties

1. Indifference curves have negative slopes
2. Higher indifference curves  $\rightarrow$  higher utility
3. Indifference curves are convex

# Preferences

## Objective function

We assume that the worker seeks maximize her utility given the set of available opportunities:

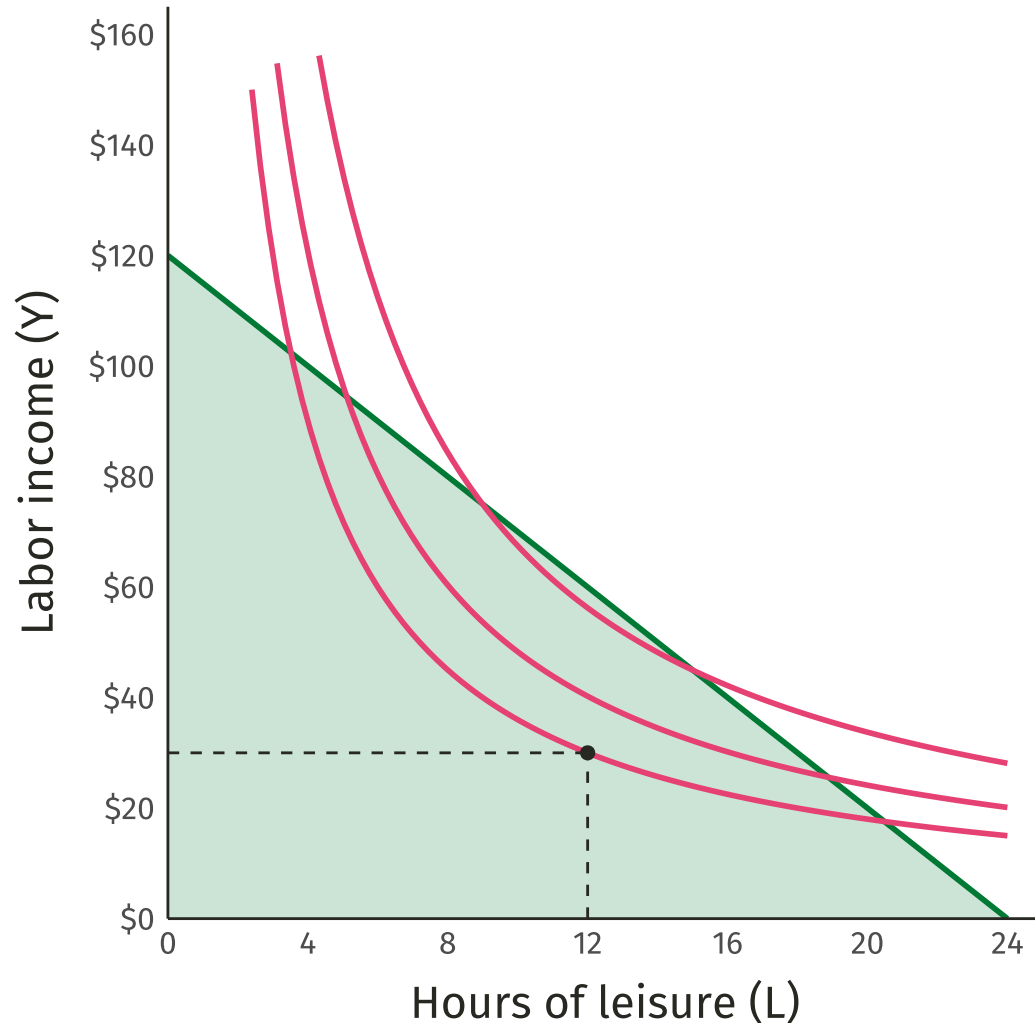
$$\max_{L,Y} U(L,Y) \text{ s.t. } Y = w(24 - L) + v$$

- The worker chooses a feasible bundle  $(L^*, Y^*)$  that yields the highest utility.
- In other words, the worker solves a **constrained optimization** problem.<sup>†</sup>

**Maximizing** your utility → "living your **best** life"

<sup>†</sup> Yet another reason why calculus is useful.

# Preferences + opportunities

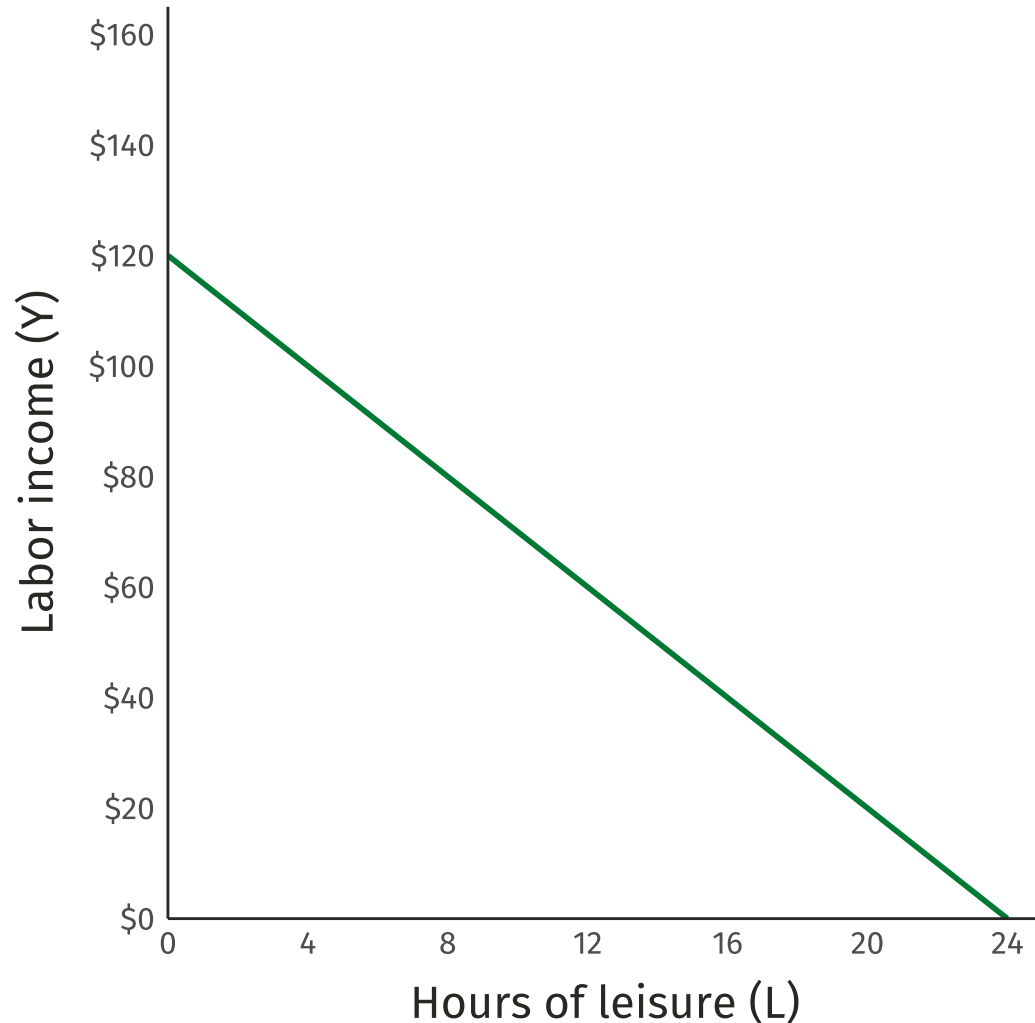


**Q:** Has this worker maximized her utility?

**A:** No!

- **Why?** There are other feasible bundles that yield higher utility!
- In this case, the worker could—without incurring additional cost—increase leisure, income, or both.

# Preferences + opportunities



## Opportunity cost

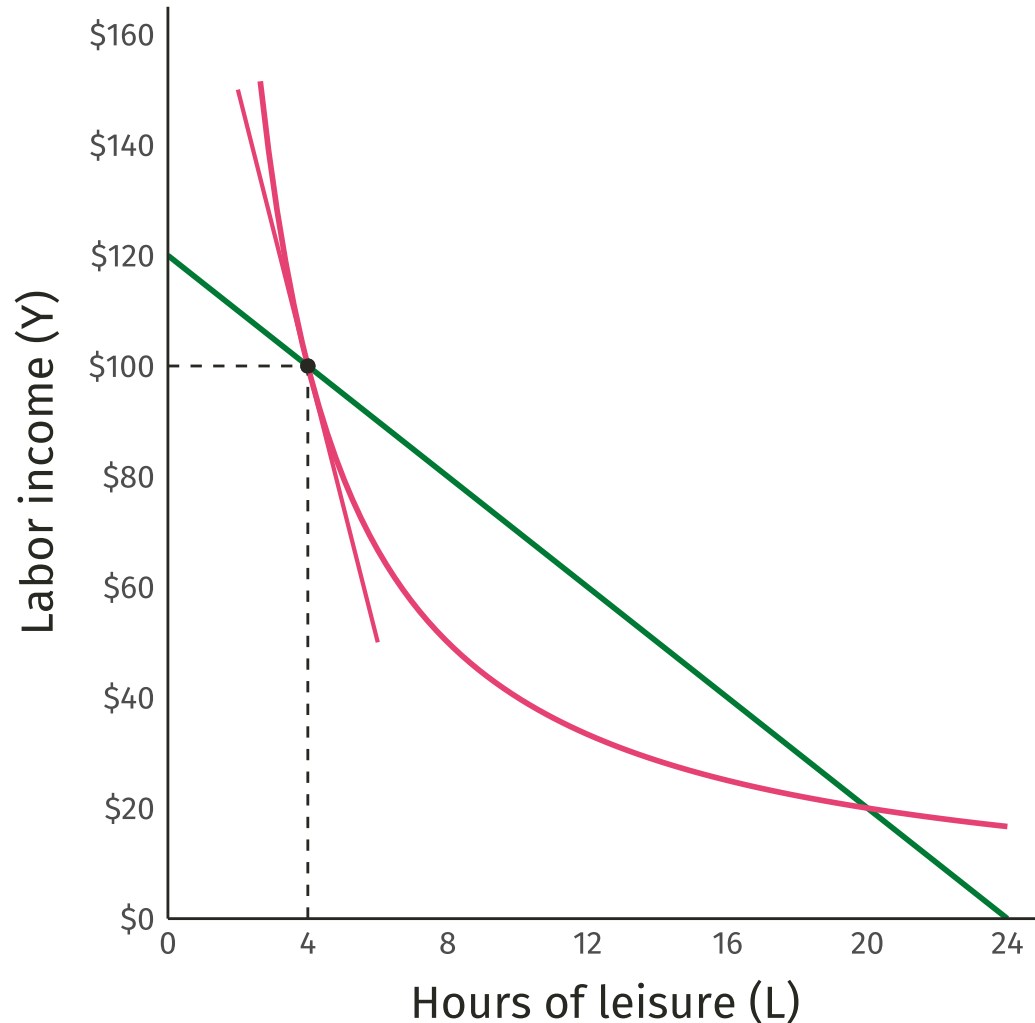
In fact, the worker will **always choose** a bundle somewhere **along the budget constraint**.

For this reason, we can interpret the slope of the budget constraint as the **opportunity cost**<sup>†</sup> of an additional hour of leisure.

- For each additional hour of leisure, you must sacrifice  $w$  dollars.

<sup>†</sup> *Opportunity cost* = The forgone value of *your* next-best alternative.

# Optimization



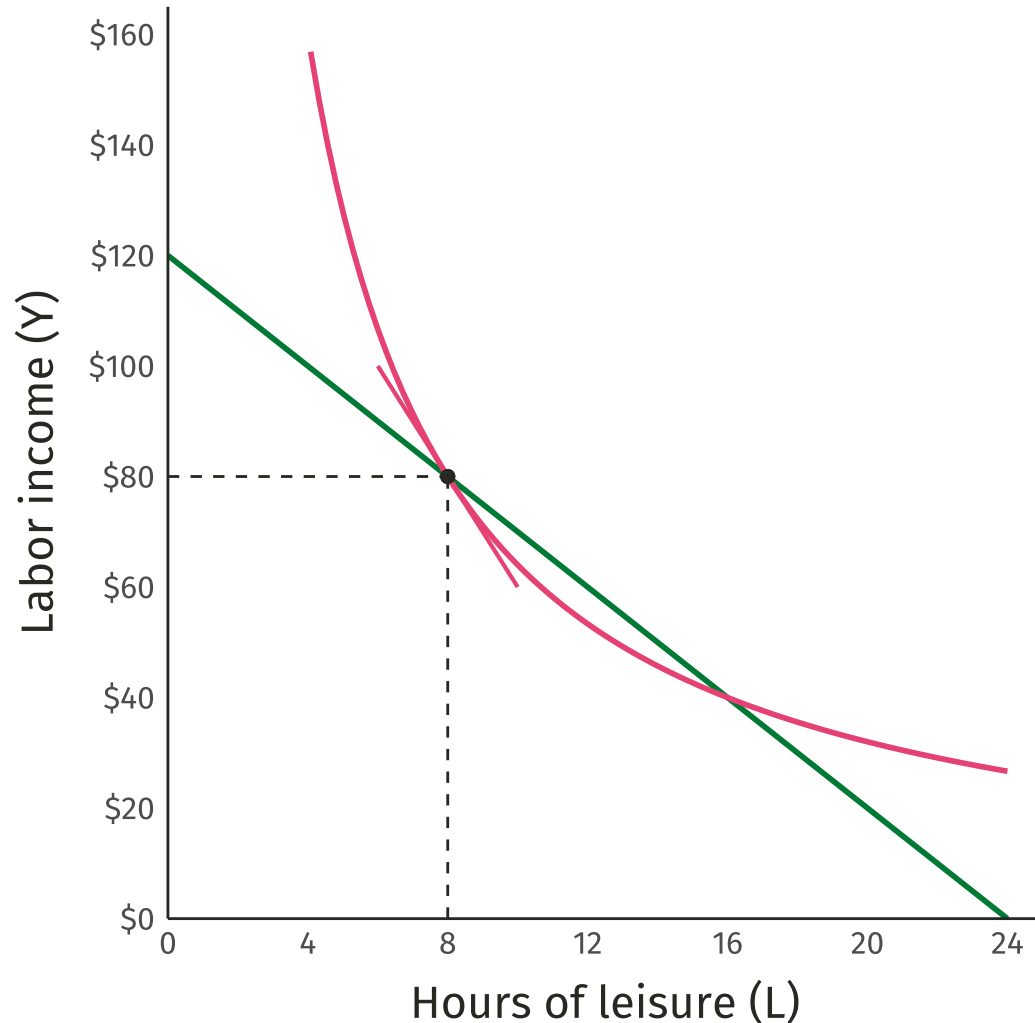
**Q:** Has this worker maximized her utility?

**A:** No. At the current bundle,

- **MRS** = -25
- **Opportunity cost** = -5

The cost of an additional hour of leisure **is less than** the worker's willingness to pay for additional hour of leisure!

# Optimization



**Q:** Has this worker maximized her utility?

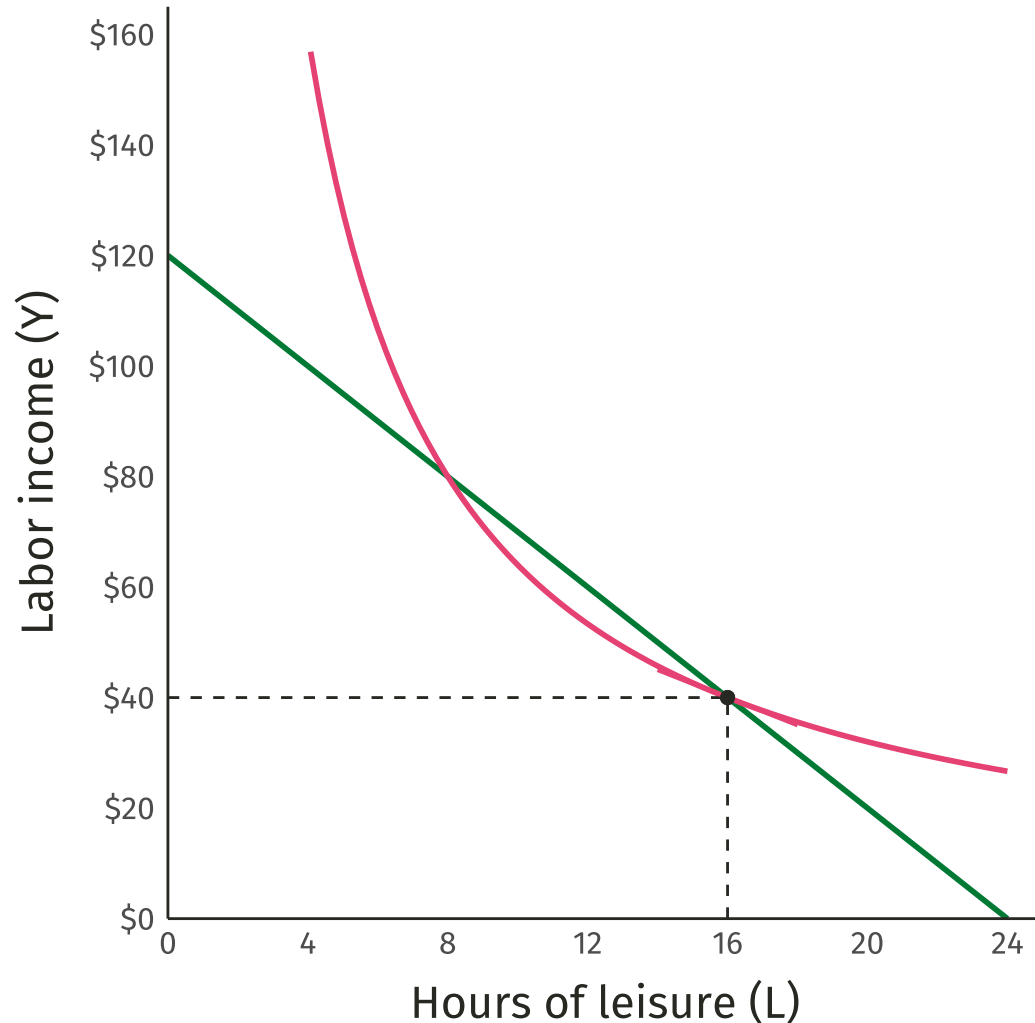
**A:** No. At the current bundle,

- **MRS** = -10
- **Opportunity cost** = -5

The cost of an additional hour of leisure **is less than** the worker's willingness to pay for additional hour of leisure!



# Optimization



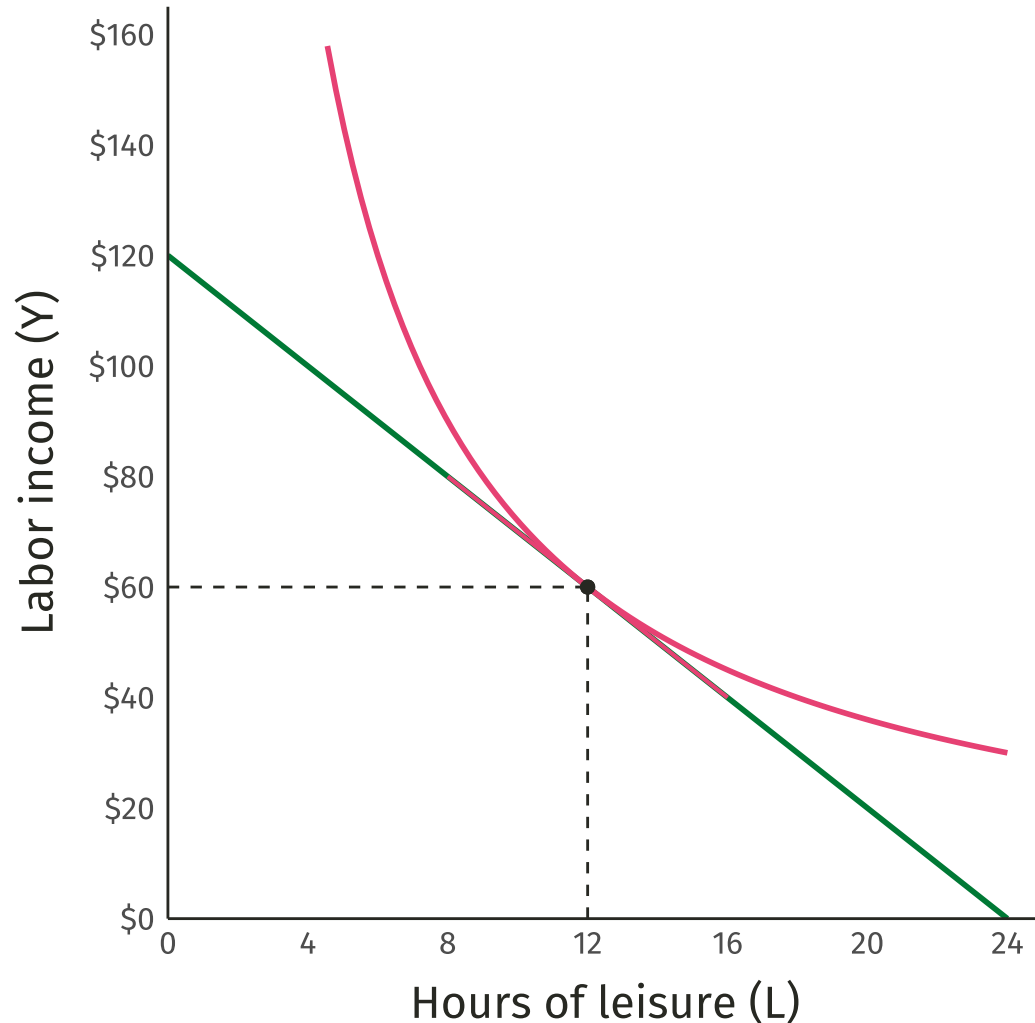
**Q:** Has this worker maximized her utility?

**A:** No. At the current bundle,

- **MRS** = -2.5
- **Opportunity cost** = -5

The cost of an additional hour of leisure **is greater than** the worker's willingness to pay for additional hour of leisure!

# Optimization



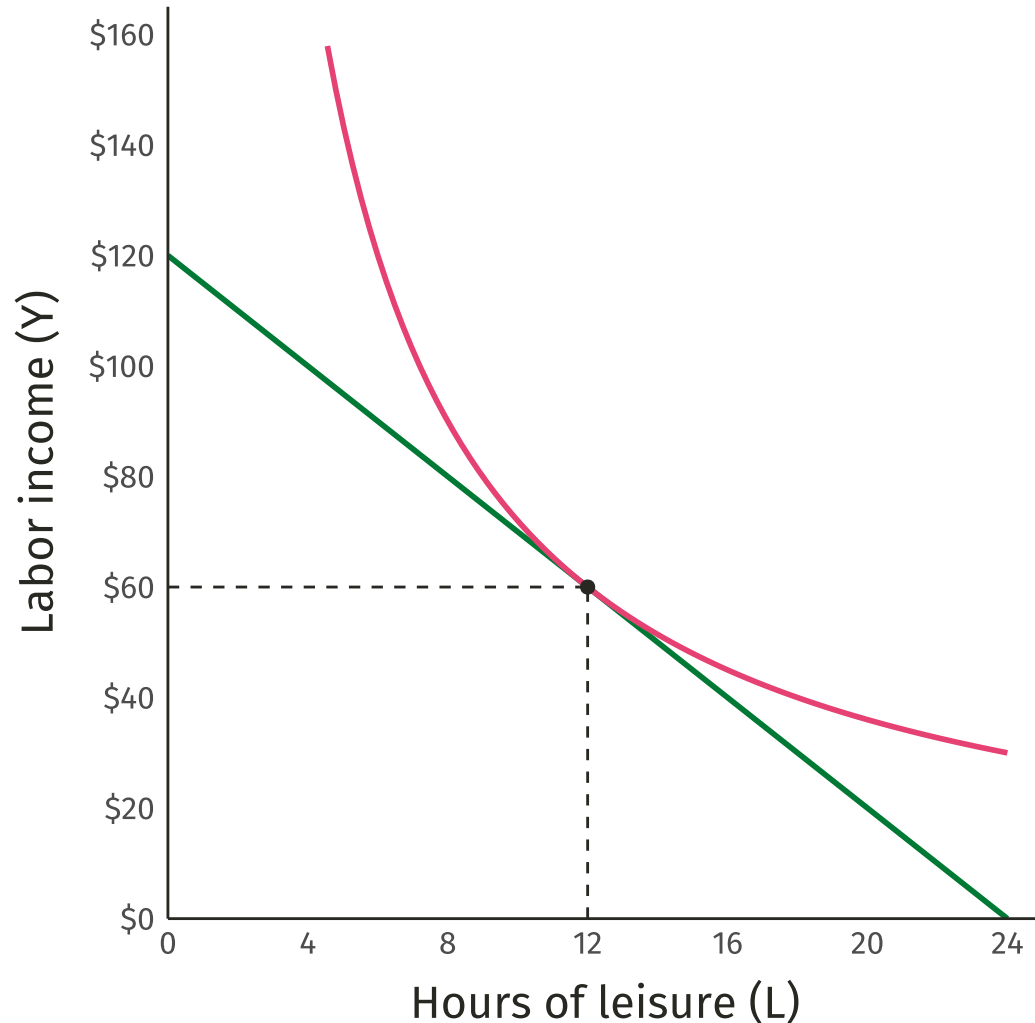
**Q:** Has this worker maximized her utility?

**A:** Yes! At the current bundle,

- **MRS** = -5
- **Opportunity cost** = -5

The cost of an additional hour of leisure **equals** the worker's willingness to pay for additional hour of leisure!

# Optimization



The worker chooses the optimal bundle  $(L^*, Y^*)$  where

$$MRS_{L,Y} = -w$$

- That is, where the indifference curve is **tangent** to the budget constraint.

# Optimization

## Intuition?

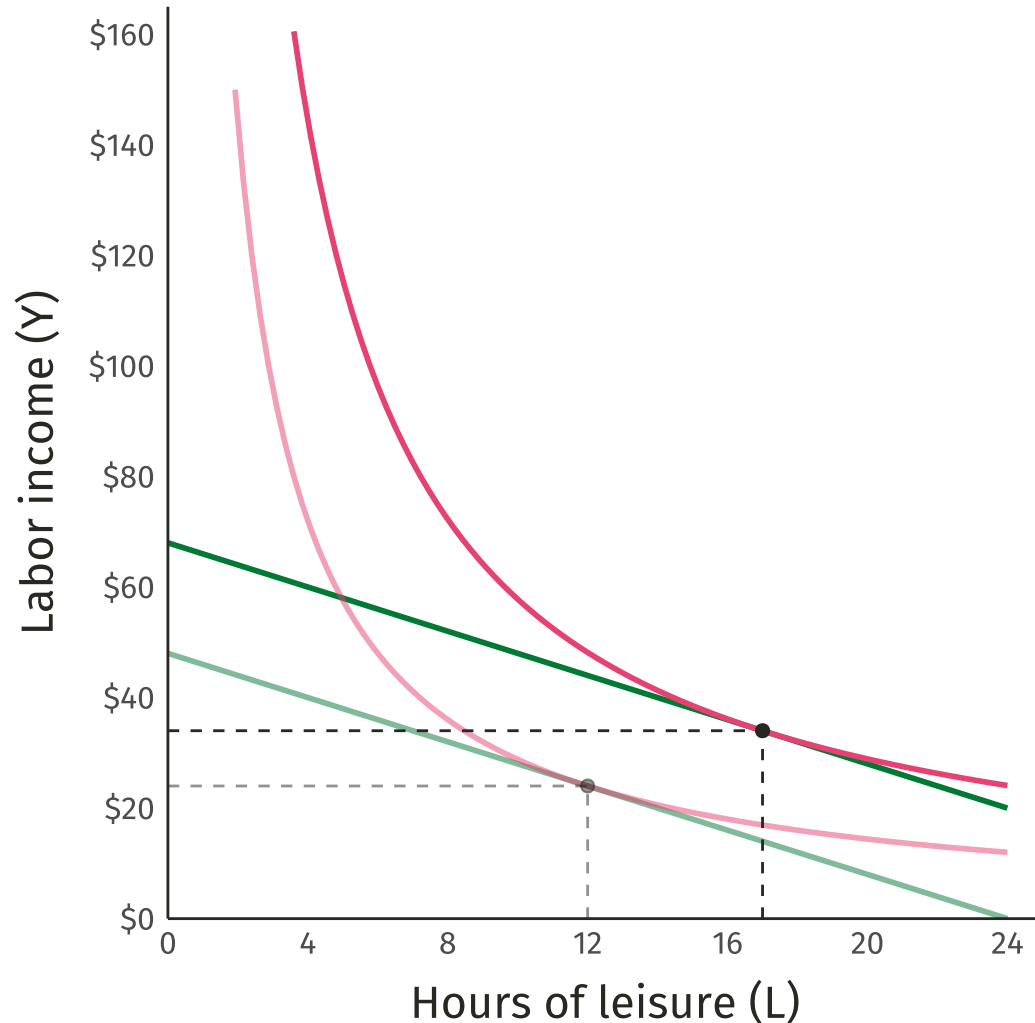
At the optimal bundle,

$$\frac{\text{MU}_L}{\text{MU}_Y} = w$$
$$\text{MU}_Y = \frac{\text{MU}_L}{w}$$

- $\text{MU}_Y$  = additional utility from spending one more dollar on consumption
- $\text{MU}_L$  = additional utility from one more hour of leisure
- $\frac{\text{MU}_L}{w}$  = additional utility from spending one more dollar on leisure

**In words?** The worker maximizes utility when the last dollar spent on leisure buys the same amount of utility as the last dollar spent on consumption.

# Worker responses



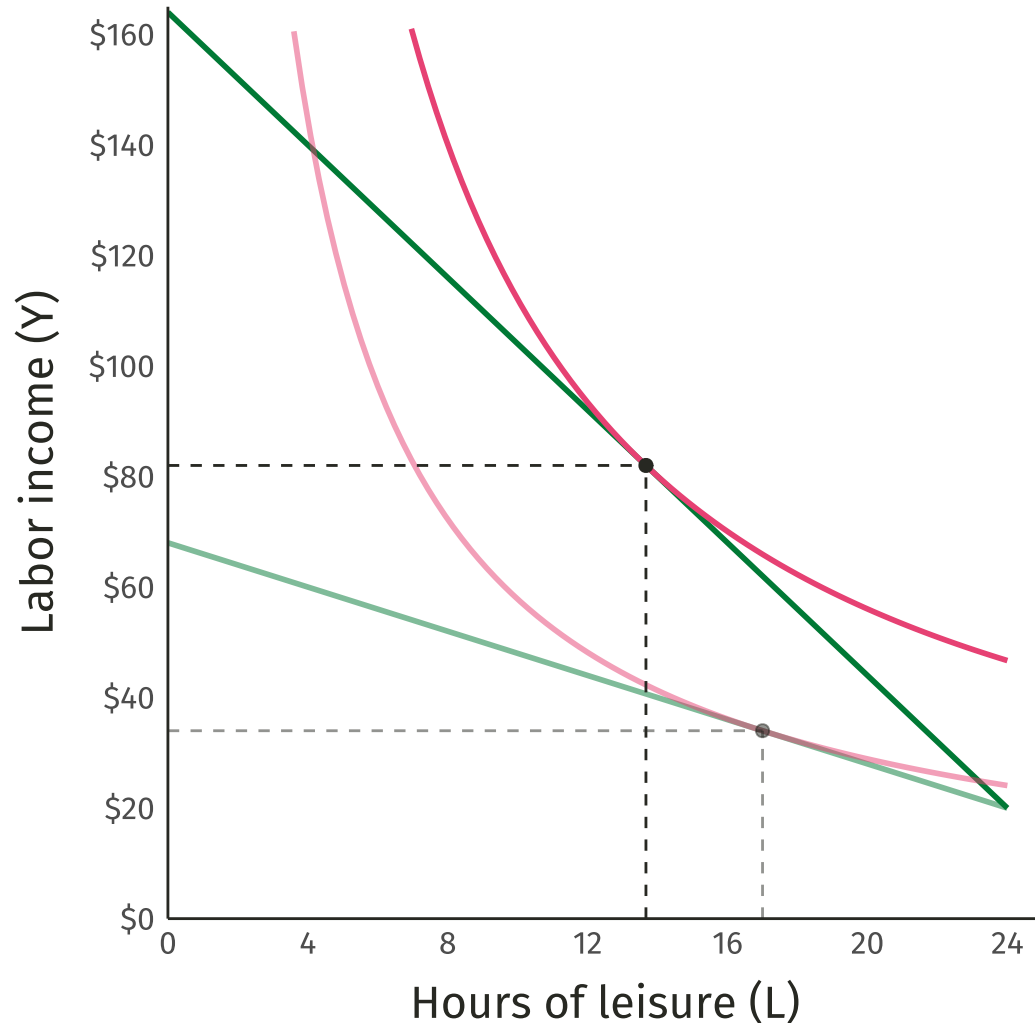
**Q:** How will this worker respond to an increase in non-labor income?

**A:** The worker will work fewer hours.

- We will always define preferences such that leisure is a **normal good**.<sup>†</sup>

<sup>†</sup> *Normal good* = A good for which consumption increases as wealth increases.

# Worker responses



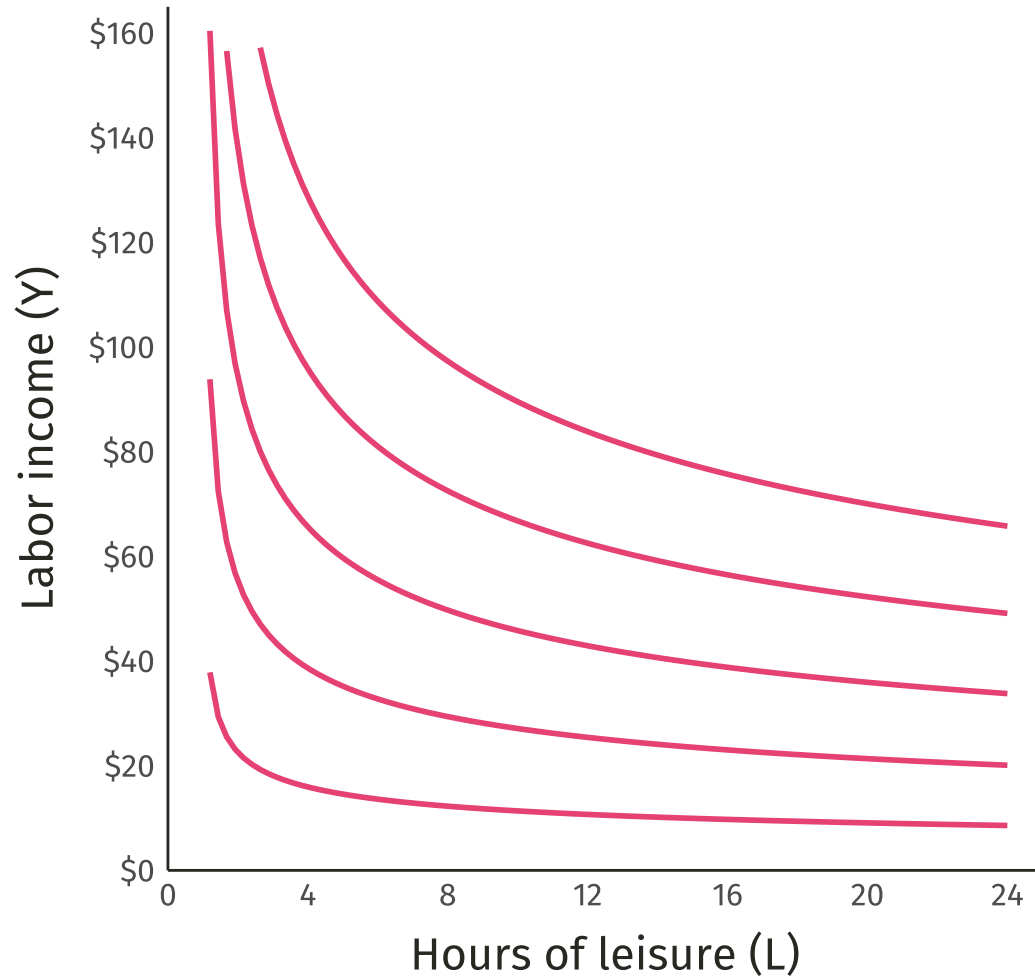
**Q:** How will this worker respond to an increase in the hourly wage?

**A:** In this case, the worker will work additional hours.

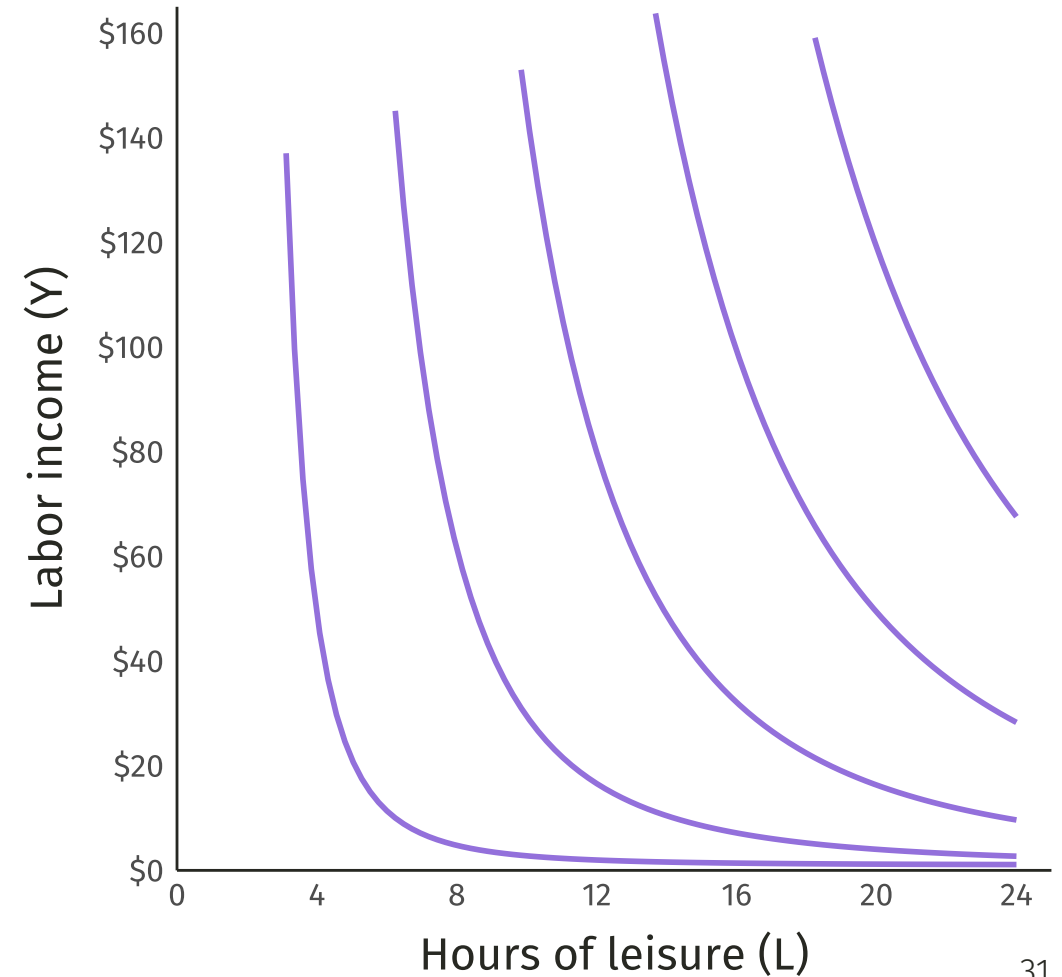
- The direction of the response depends on wealth and substitution effects. (More on this later.)

# Comparing workers

Money lover

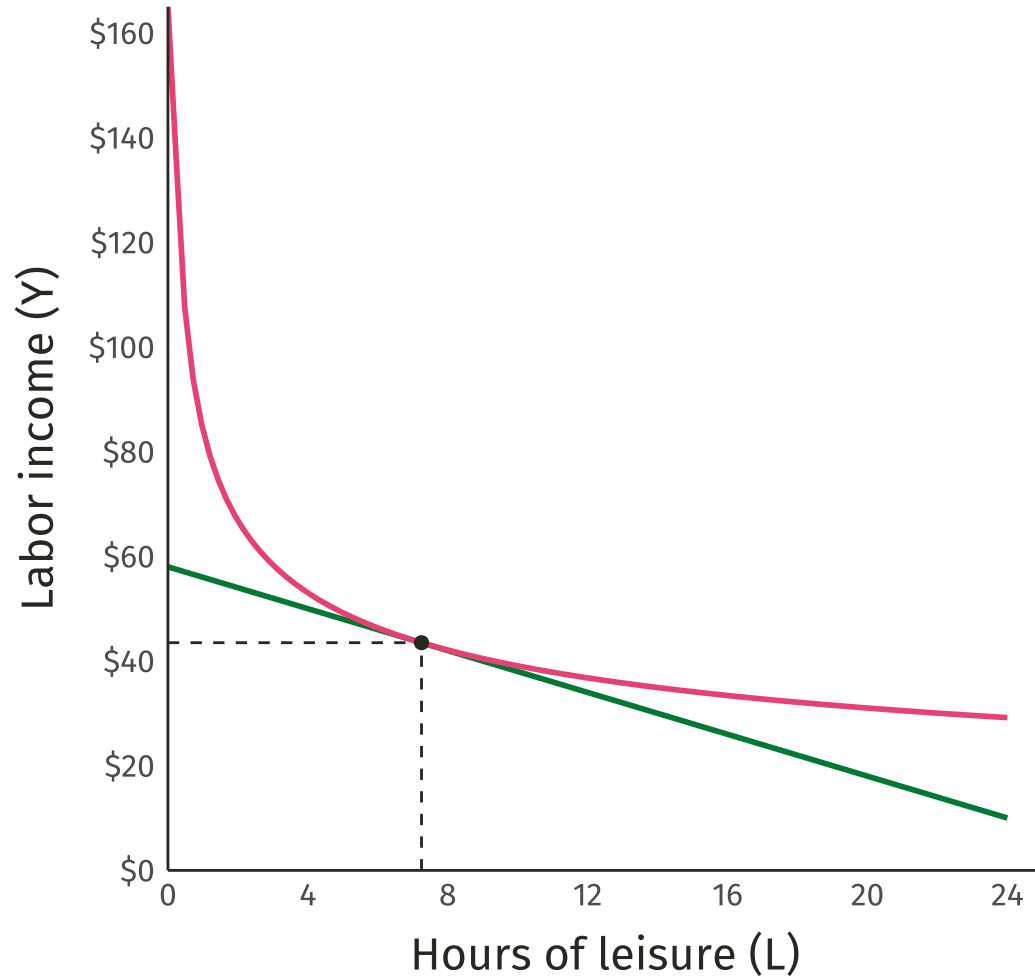


Leisure lover

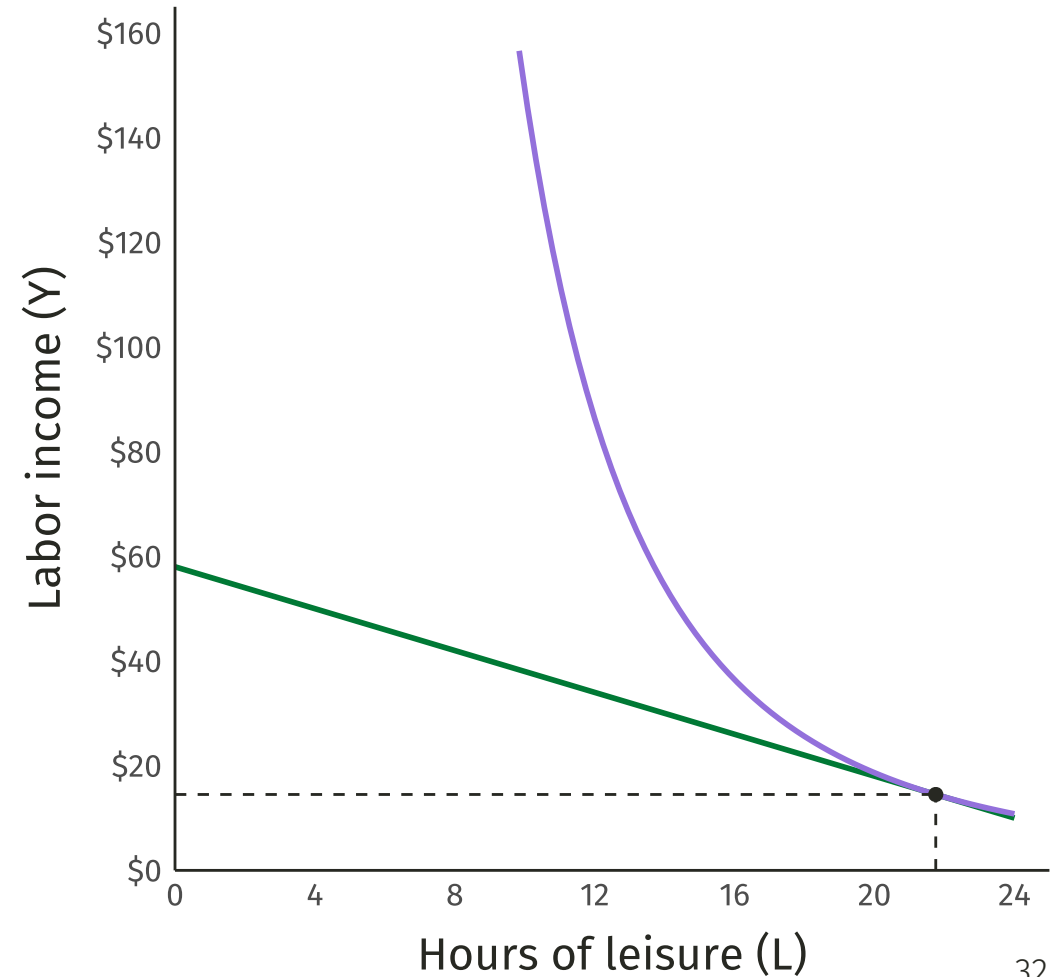


# Comparing workers

Money lover



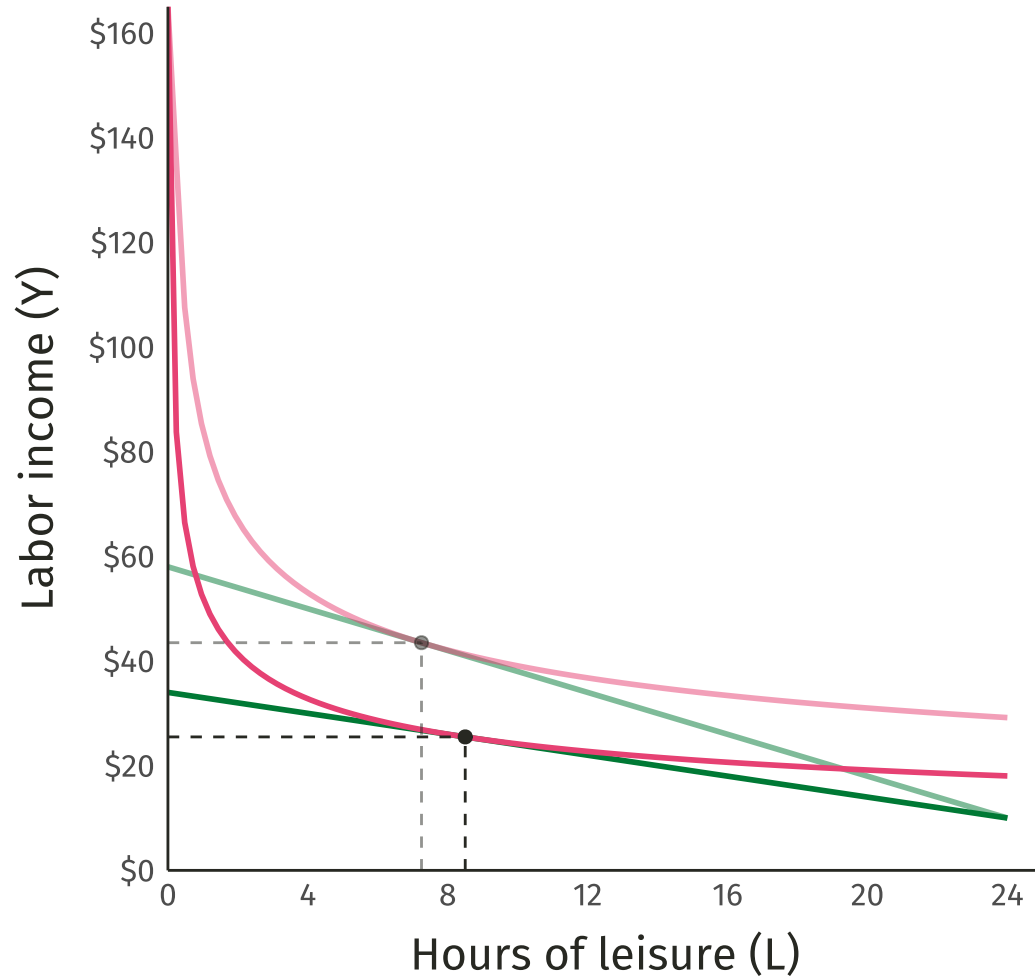
Leisure lover



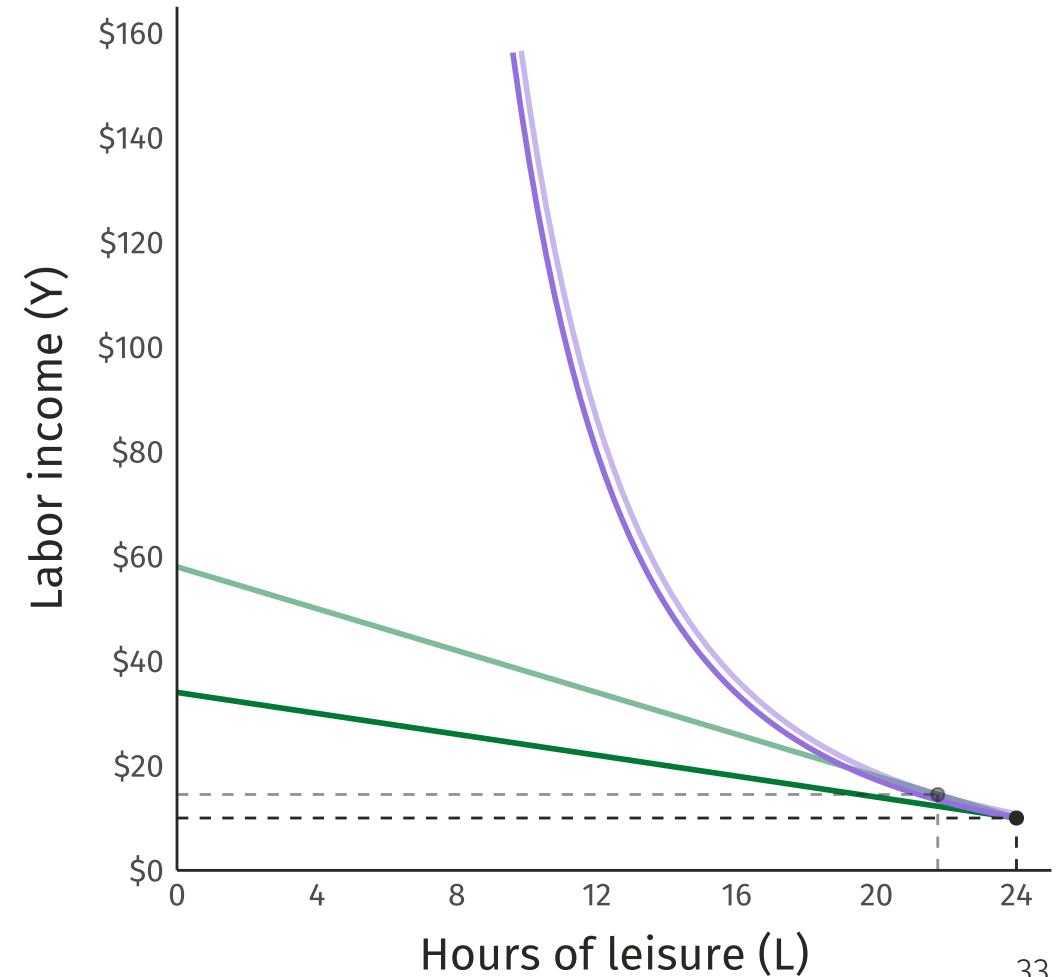


# Comparing workers

Money lover



Leisure lover



# Implications for policy?

Even in a truly equal-opportunity world<sup>†</sup>, **differences in preferences will lead to unequal outcomes** (e.g., earnings).

**Q:** Is this bad?

**A:** This is fundamentally a normative question. But **a policy that forces people** with different preferences **to make the same choices** without compensation **will necessarily make someone worse off** without helping anyone else.

- No normative claim here! This is a positive statement (someone *will* end up on a lower indifference curve).

<sup>†</sup> Not this one!

# Housekeeping

**Assigned reading for ~~Wednesday~~ Sunday:** Effective policy for reducing poverty and inequality? The Earned Income Tax Credit and the distribution of income by Hilary Hoynes and Ankur Patel (2018).

- I will post the paper on Canvas tonight.
- Reading Quiz 4 will open Wednesday night and will be due Sunday night.

**Problem Set 1** due Friday by 11:59pm PDT.