ECONOMICS 1 (sem 2)

Tutorial 6

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https://diegobattiston.github.io

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Questions to cover today

- Q8
- Q9

Labour Supply

- Q19
- Q20
- Q18
- Q17

Labour Demand

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Labour Supply Decision

- Individual enjoys two goods:
  1) Consumption Goods (i.e. income)
  2) Leisure (i.e. 24-worked hours)
- There is a wage per worked hour
- Can work maximum 24 hs. per day
- Can work zero hours but no income then

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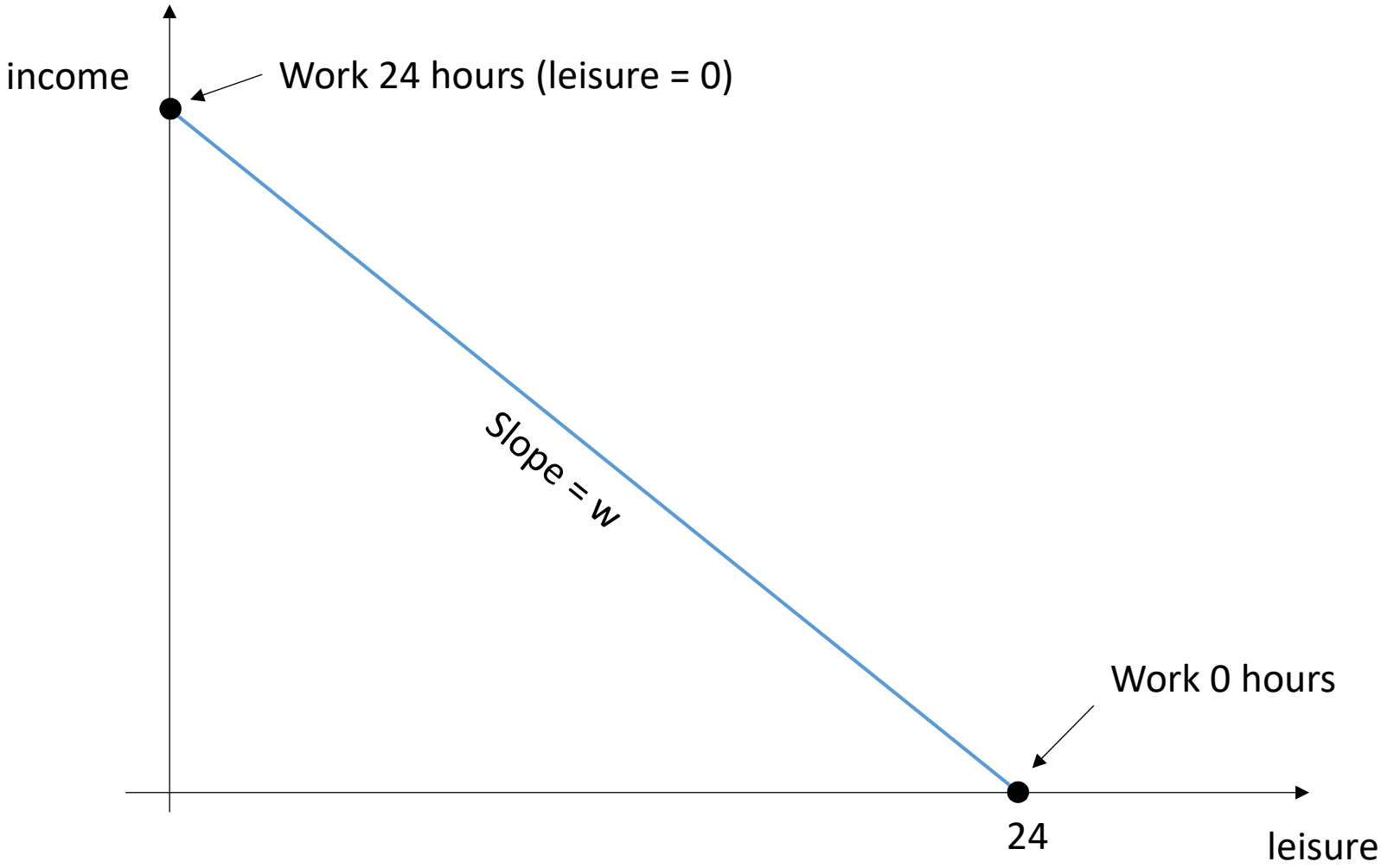
Labour Supply Decision



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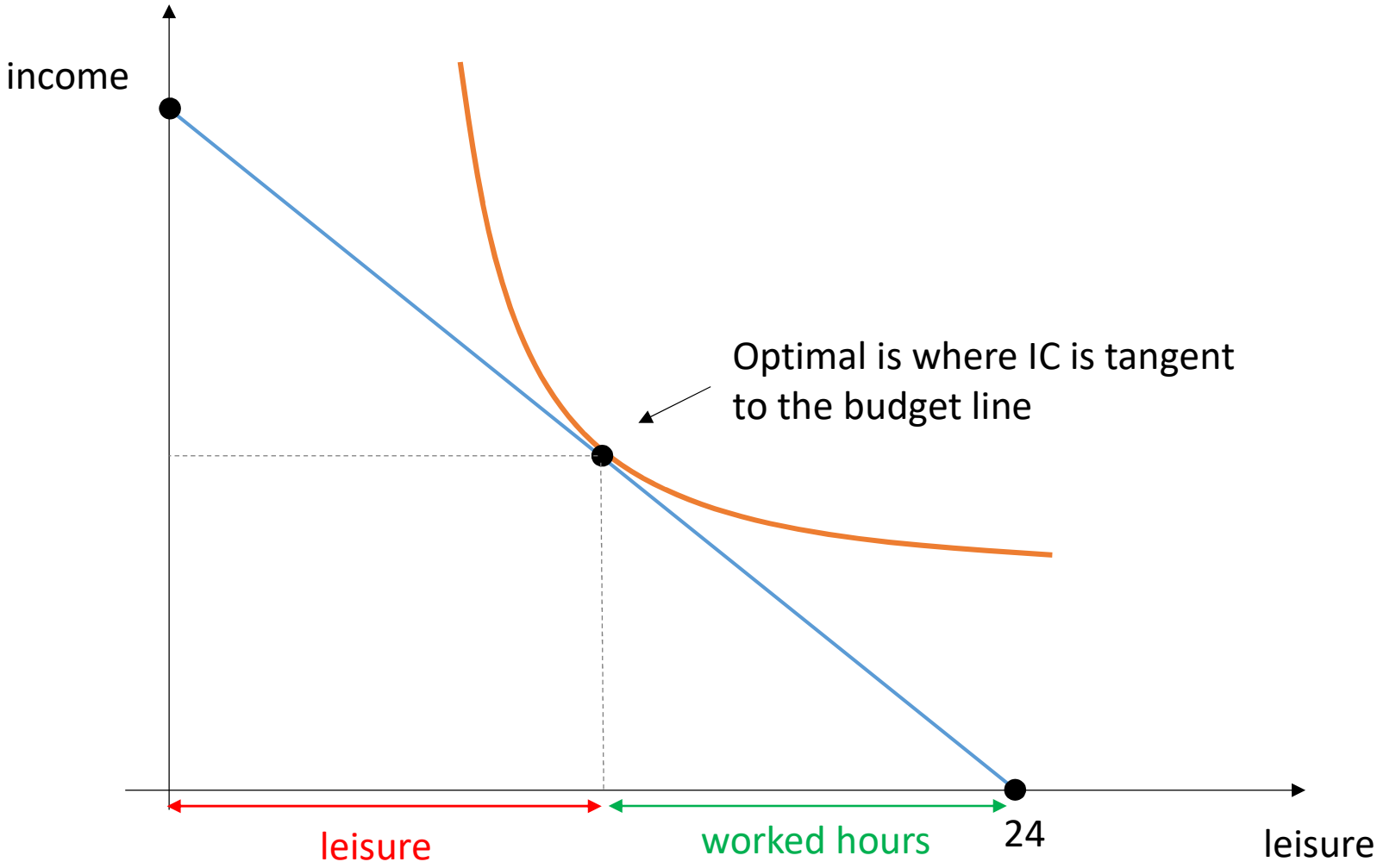
Labour Supply Decision



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Question 8

- Smith has a job and is offered a new job
- **Current Job:**
  - w = \$1 for the first 8 hours, then \$2.5 for each hour above 8
  - Chooses to work 12hs per day
- **New Job:**
  - w = \$1.5 for any worked hour

Will he take the new job?

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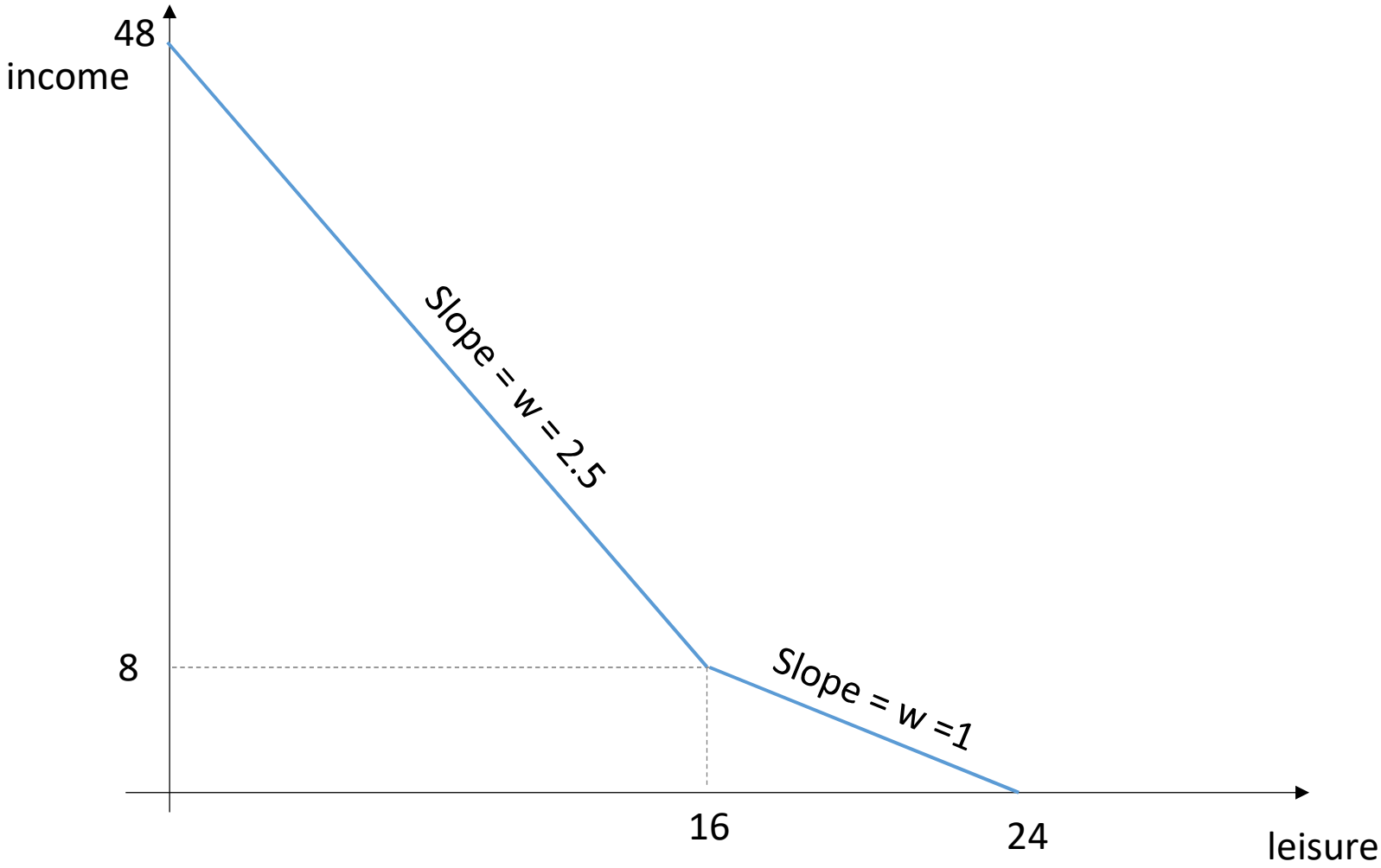
Current job



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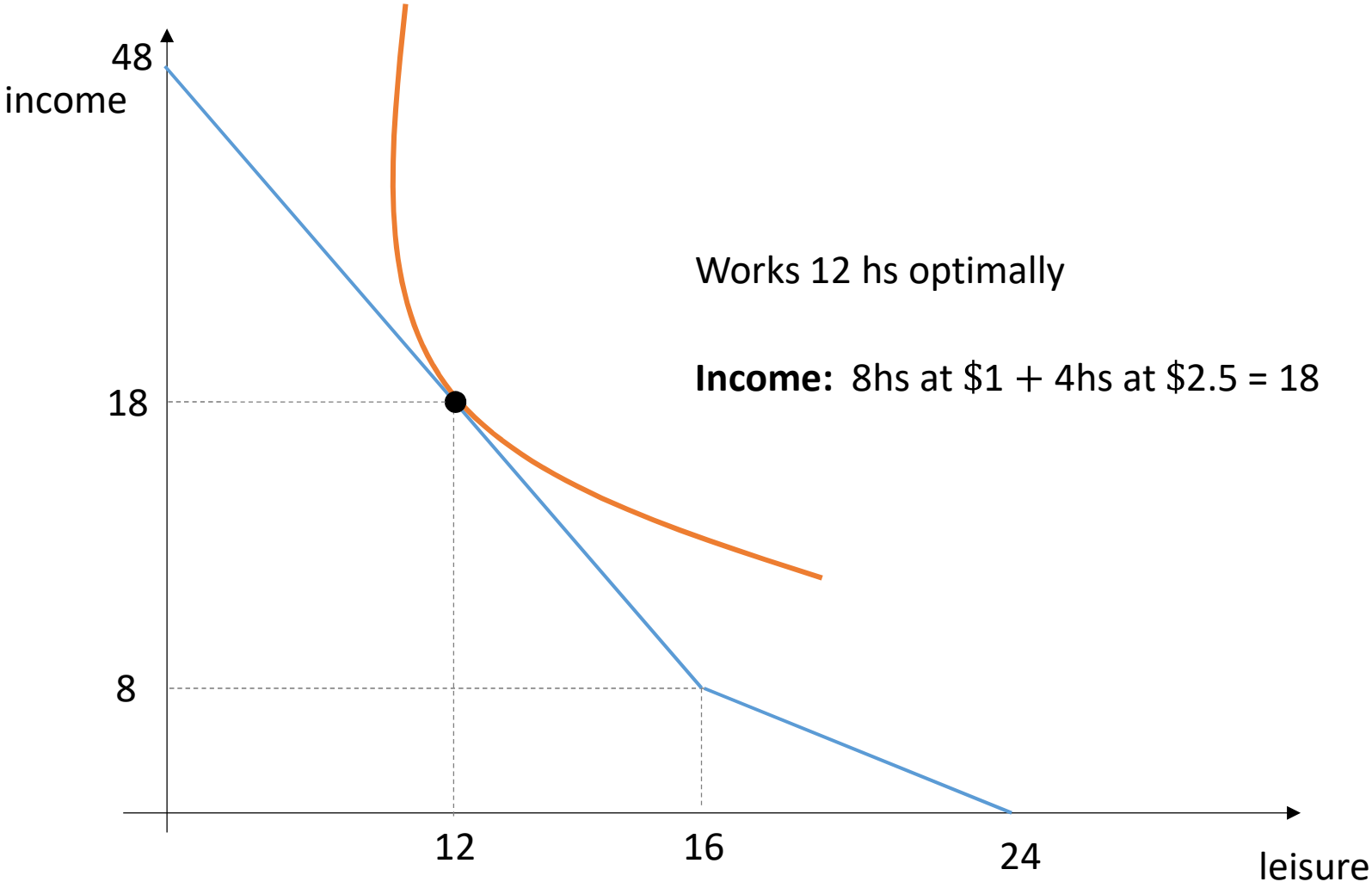
Current job



Works 12 hs optimally

Income: 8hs at \$1 + 4hs at \$2.5 = 18

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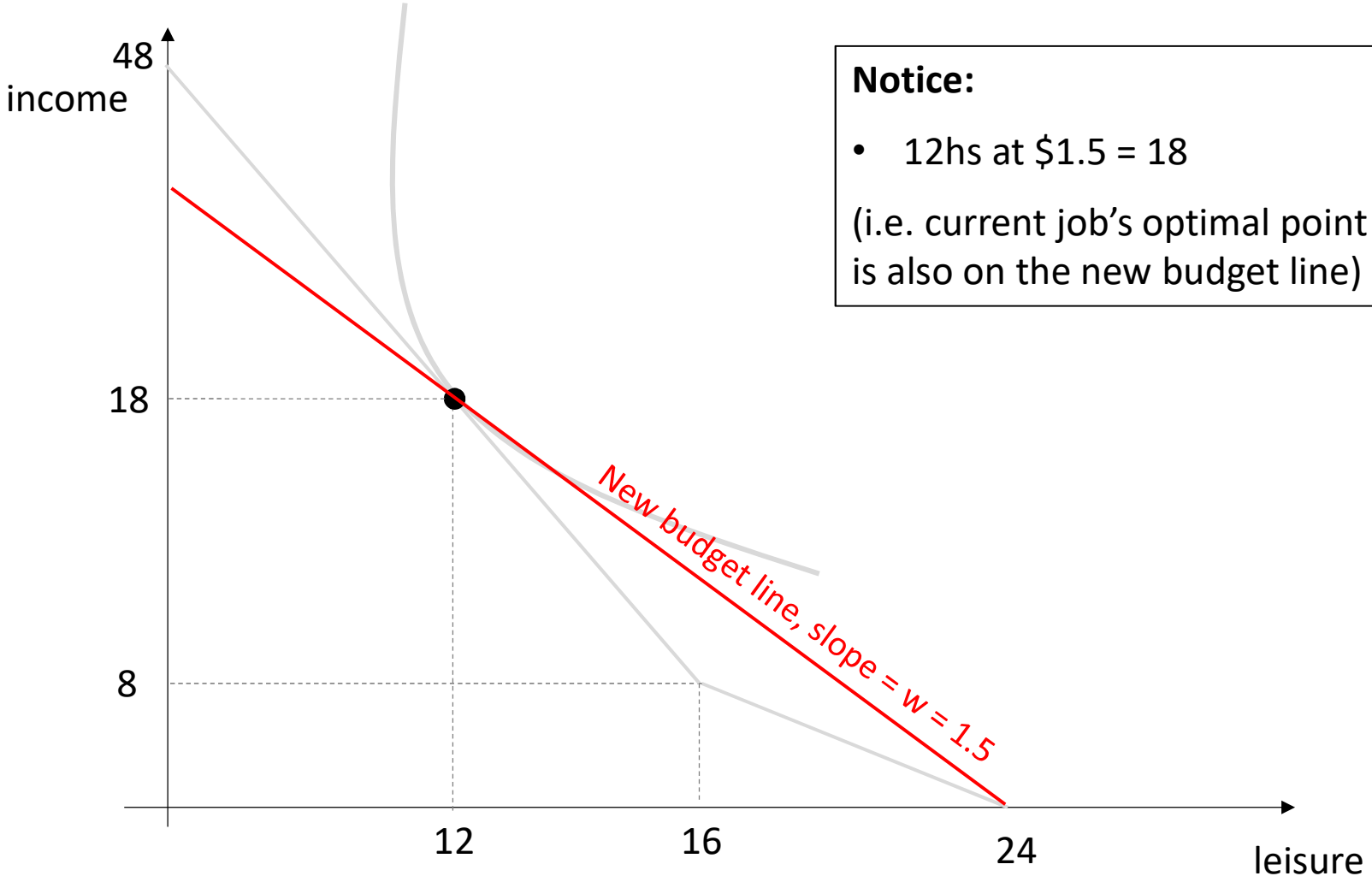
New job



Notice:

- 12hs at $1.5 = 18

(i.e. current job's optimal point is also on the new budget line)

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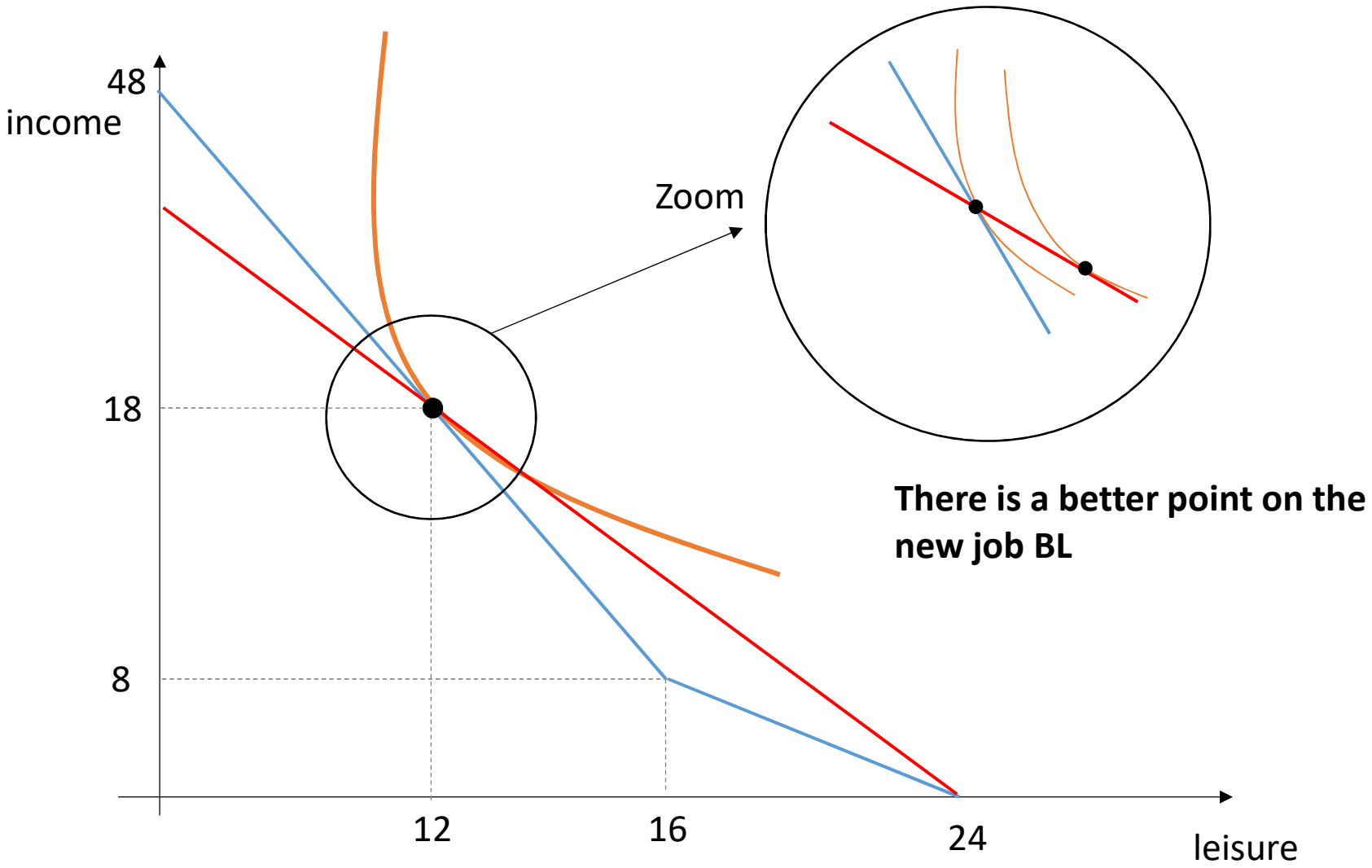
Compare jobs



There is a better point on the new job BL

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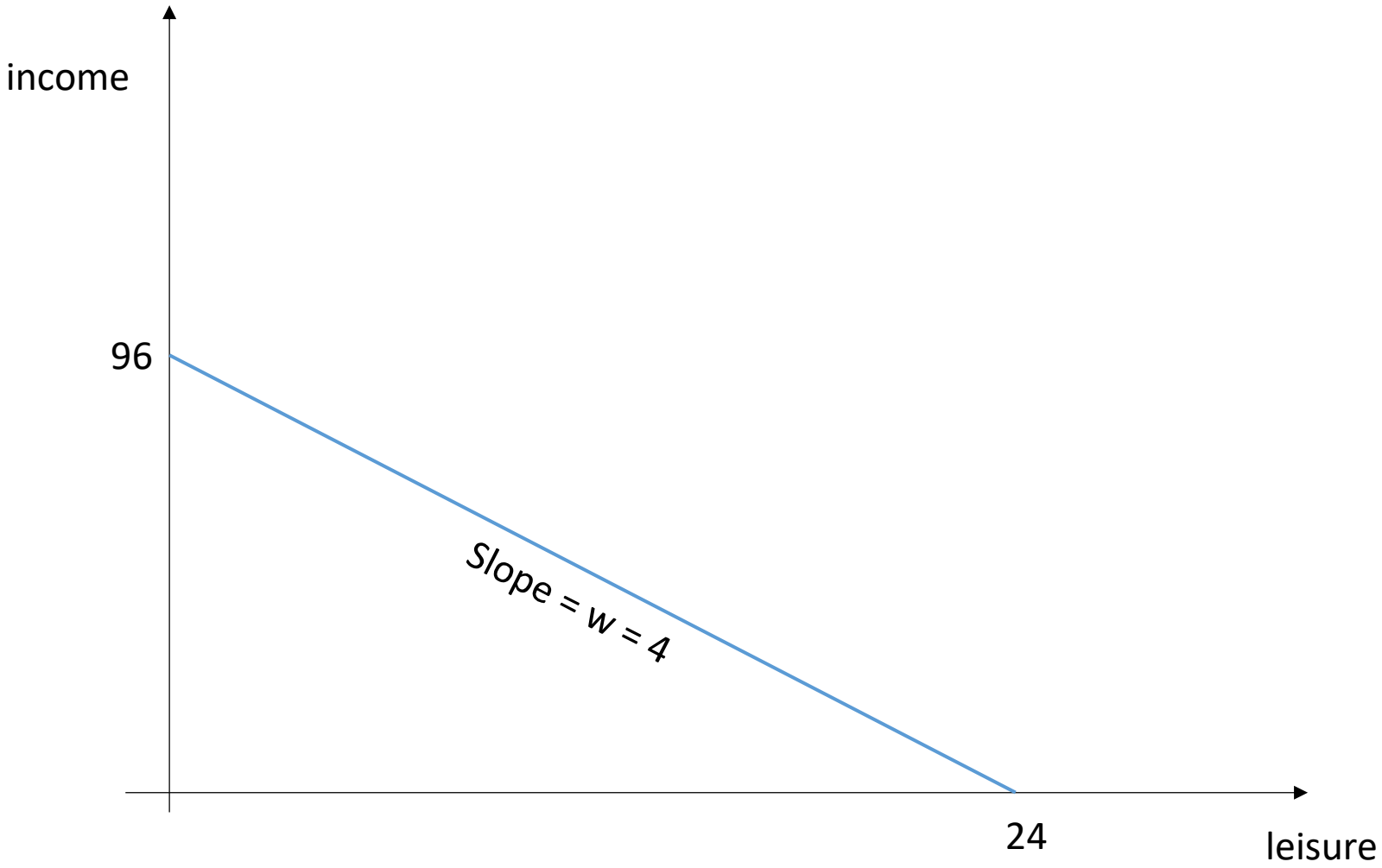
Question 9

Two antipoverty programs:

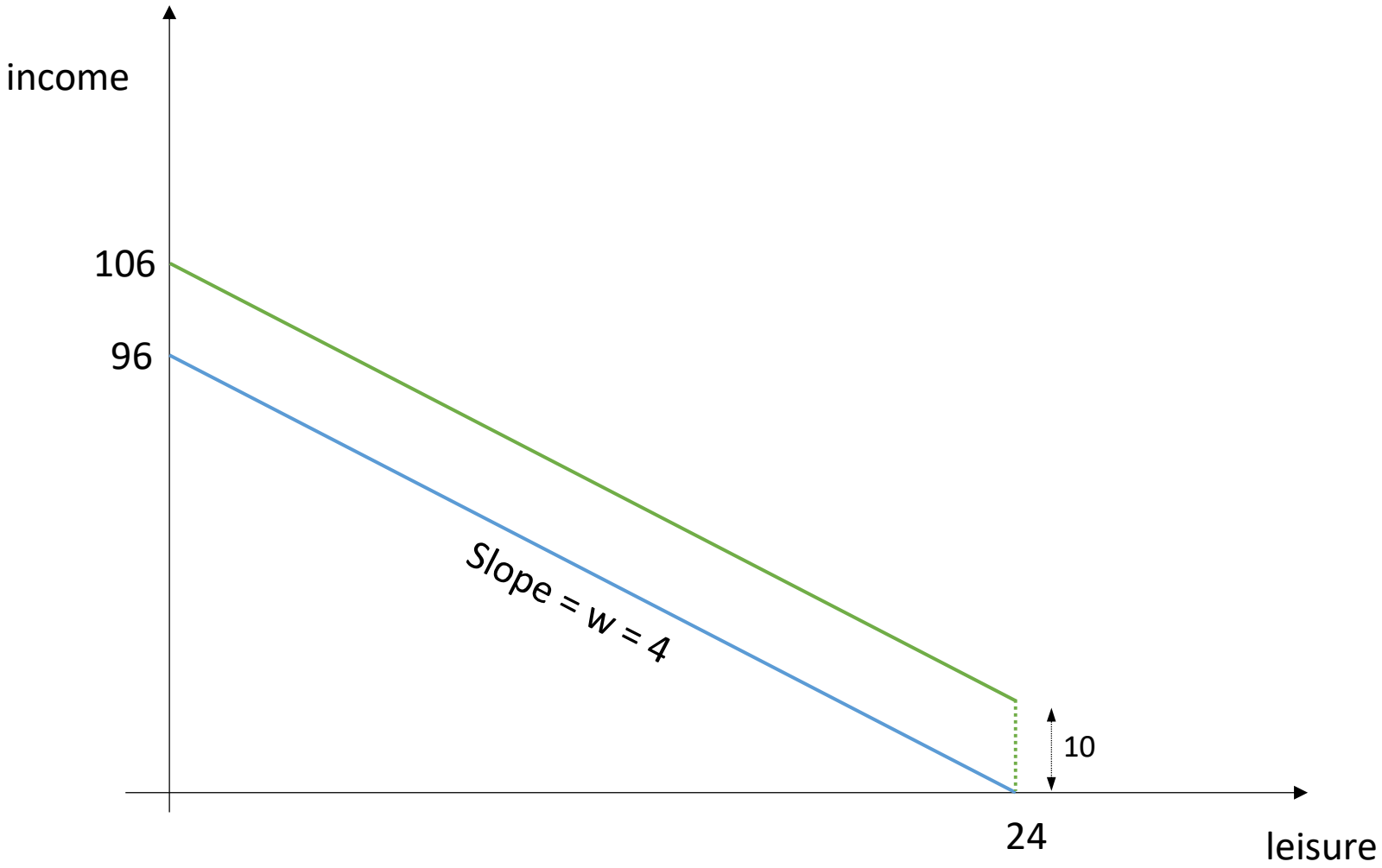
1) $10 per day if you are poor
2) Benefit of 20% of earned wage if you are poor

a) If $w = 4$, show how the budget constraint changes in each case
b) Which program is most likely to reduce worked hours?

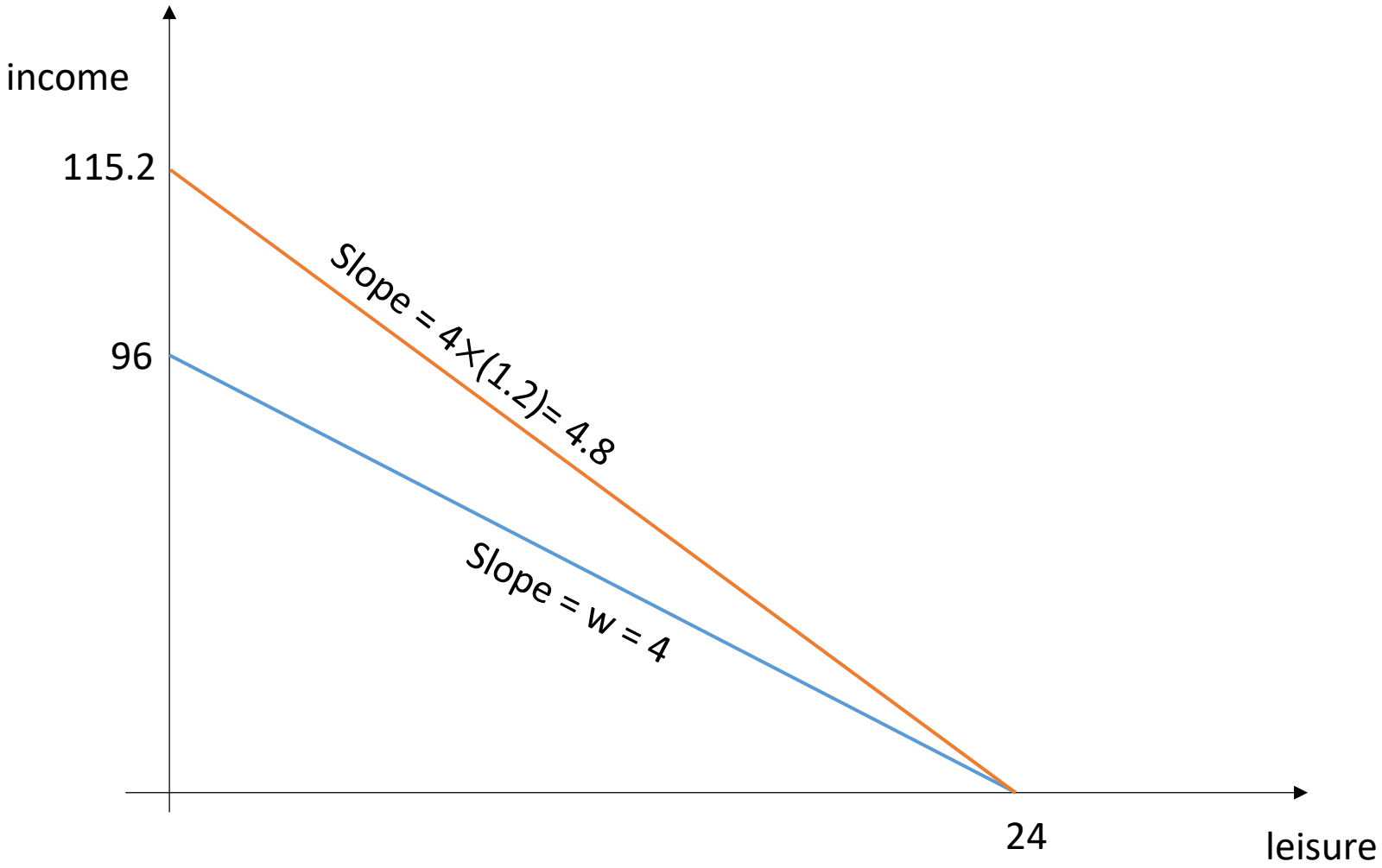
Initial situation



Program 1



Program 2



Which program is most likely to reduce working hours?

- Assume that leisure is a normal good
- P1 only has income effect as it does not change relative price between consumption and leisure
- P2 makes consumption cheaper (and leisure relatively more expensive)
- Then, P1 is most likely to increase leisure (and reduce worked hours)

Labour Demand

- **Simplest case:** Firm faces competitive good and labour markets:
    1) Price of the good is given
    2) Wage is given

- An additional worker produces: $MP_L \times p$
- An additional worker costs: w

Rule (labour demand): $MP_L \times p = w$

Example: Question 19

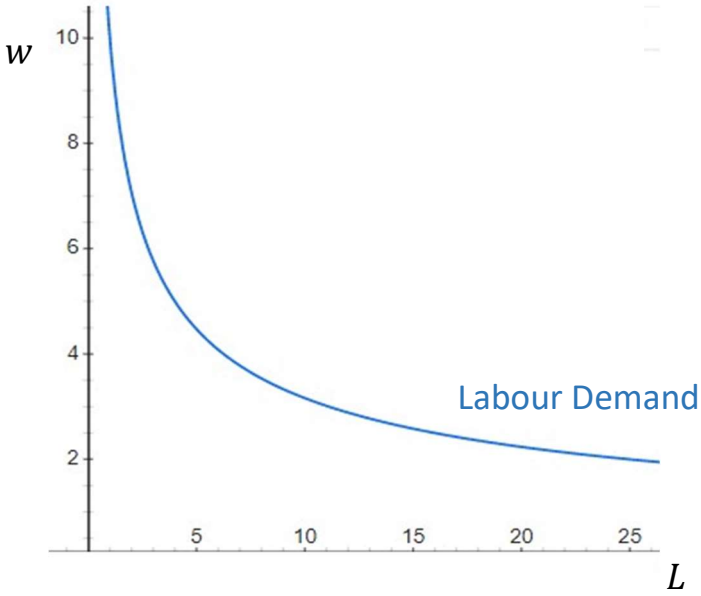
Q19. A firm produces output according to the production function $Q = K^{\frac{1}{2}} L^{\frac{1}{2}}$. If it sells its output in a perfectly competitive market at a price of 10, and if K is fixed at 4 units, what is this firm's short-run demand curve for labour?

$$Q = 2\sqrt{L}$$

$$MP_L = \frac{1}{\sqrt{L}}$$

Optimal Rule: $p \times MP_L = w$

$$\Rightarrow \quad \boxed{w = \frac{10}{\sqrt{L}}}$$



Case with monopoly in goods market

- w still given but p depends on production
- An extra worker generates revenues: $MP_L \times MR$
- An extra worker costs: w

Rule (labour demand): $MP_L \times MR = w$

Example: Question 20

Q20. How would your answer to the preceding problem be different if the employer in question sold his product according to the demand schedule $P = 20 - Q$?

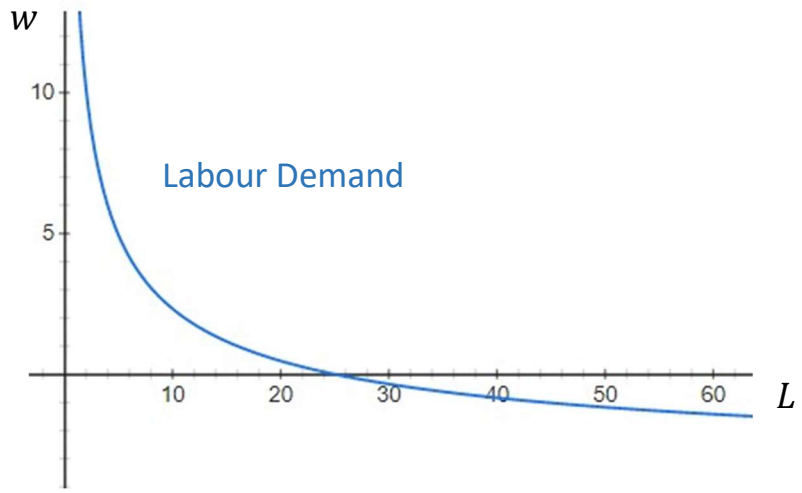
$$MP_L = \frac{1}{\sqrt{L}}$$

$$MR = 20 - 2Q = 20 - 4\sqrt{L}$$

Optimal Rule: $MR \times MP_L = w$

$$\left(20 - 4\sqrt{L}\right)\frac{1}{\sqrt{L}} = w$$

$$\Rightarrow \quad \boxed{w = \frac{20}{\sqrt{L}} - 4}$$



Case with monopsony in labour market

- **Competitive labour market:**

  Hiring an additional worker (or hour) costs w

- **Monopsonist:**

  Faces whole labour supply

  Hiring an extra worker increases wage

  Optimal condition is very similar, MC_L instead of w:

$$\boldsymbol{P \times MP_L = MC_L}$$

Example: Question 18

a) Firm is price taker in product market AND monopsonist in labour market:

- $\mathrm{P} = 8$
- $\mathrm{MP_L} = 5$
- Labour Supply $\mathrm{W} = 10 + \mathrm{L}$

Find L, W, Q

Total labour cost: $\mathrm{W} \times \mathrm{L} = (10 + \mathrm{L})\mathrm{L} = 10\mathrm{L} + \mathrm{L}^2$

Cost of hiring an <u>additional</u> worker: $MC_L = 10 + 2\mathrm{L}$

$$\underbrace{\boldsymbol{P}}_{8} \times \underbrace{\boldsymbol{MP_L}}_{5} = \underbrace{\boldsymbol{MC_L}}_{10+2L}$$

$$\mathrm{L} = 15$$
$$\mathrm{W} = 25$$
$$Q = 75$$

Note:

We assume that hiring an additional worker increases wage of ALL workers

b) Firm is Monopolist in product market AND Monopsonist in labour market

- $\mathrm{P} = 102 - 1.96\mathrm{Q}$
- $\mathrm{MP_L} = 5$
- Labour Supply $\mathrm{W} = 10 + \mathrm{L}$

Find L, W, Q, P

$$\boldsymbol{MR} \times \boldsymbol{MP_L} = \boldsymbol{MC_L}$$

$$(102 - 3.92\mathrm{Q}) \times 5 = 10 + 2L$$

$$(102 - 3.92(5\mathrm{L})) \times 5 = 10 + 2L$$

$$\mathrm{L} = 5$$
$$\mathrm{W} = 15$$
$$Q = 25$$
$$P = 53$$

c) Starting from L=5 and w=15: The firm can hire additional workers (at higher wage) but it does not have to pay more to already hired workers.

Will L increase?

Extra worker:

- Will cost W=17
- Will produce 5 units
  - p drops from 53 to $102 - 1.96 \times 30 = 43.2$
  - Total revenues changes from: $25 \times 53 = 1325$ to $30 \times 43.2 = 1296$

Obviously not convenient to hire an extra worker (even if you pay nothing)

Question 17

A firm is Monopolist AND Monopsonist:

- Demand product $\mathrm{P} = 100 - \mathrm{Q}$,
- Production function $\mathrm{Q} = 4\mathrm{L}$
- Labour Supply $\mathrm{W} = 40 + 2\mathrm{L}$

Find L and W (you can also find Q and p)

Optimal Hiring Rule:

$$\boldsymbol{MR} \times \boldsymbol{MP_L} = \boldsymbol{MC_L}$$

- **Monopoly:** $\mathrm{MR} = 100 - 2\mathrm{Q}$
- **Monopsony:** Total cost of hiring is $\mathrm{W.L} = (40 + 2\mathrm{L})\mathrm{L}$

  Then, $MC_L = 40 + 4L$

Replace in the equation and solve for L

$$\underbrace{\boldsymbol{MR}}_{(100-2\mathrm{Q})} \times \underbrace{\boldsymbol{MP_L}}_{4} = \underbrace{\boldsymbol{MC_L}}_{40+4L}$$

$$(100 - 2\mathrm{Q})\,4 = 40 + 4L$$

$$(100 - 8\mathrm{L})4 = 40 + 4L$$

$$\boxed{\mathrm{L} = 10}$$

$$\boxed{\mathrm{W} = 60}$$