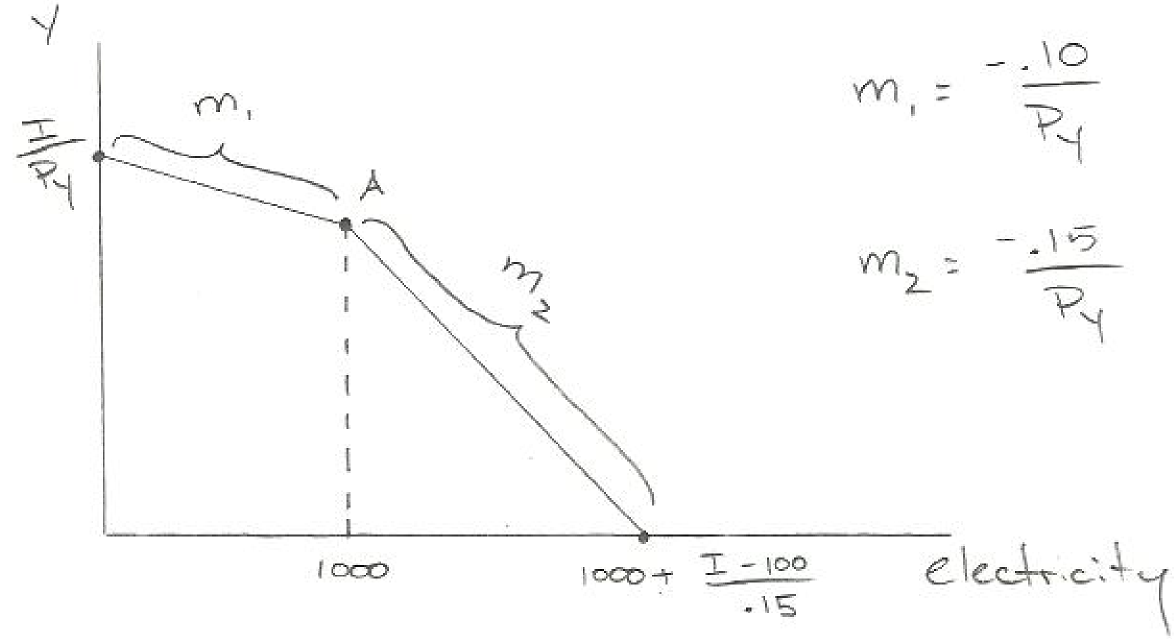
(1) a) O   d) O

b) C   e) C

c) O

(2)



$m_1 = -\frac{.10}{P_Y}$

$m_2 = -\frac{.15}{P_Y}$

Equation of a Line: $Y = mX + b$

Budget Constraints: $I = P_Y \cdot Y + .10e$ (for m_1)

$I = P_Y \cdot Y + .15e$ (for m_2)

- Find the slope of the BC for the two different parts.
- Use the BCs and solve for Y

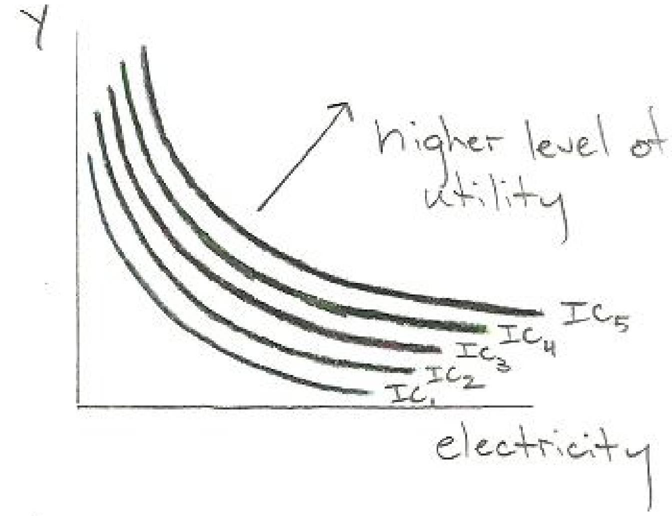
$I = P_Y \cdot Y + .10e$

$\Rightarrow P_Y Y = -.10e + I$

$\Rightarrow Y = -\frac{.10e}{P_Y} + \frac{I}{P_Y}$

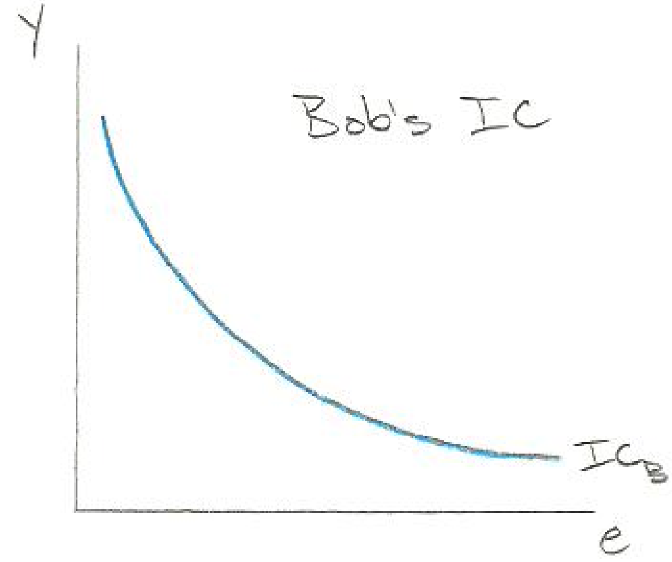
$\therefore m_1 = -\frac{.10e}{P_Y}$

② Continued...

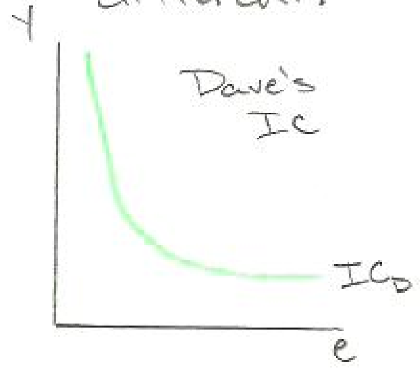


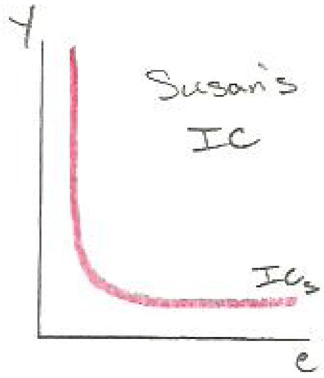
... $IC_5 > IC_4 > IC_3$ ...

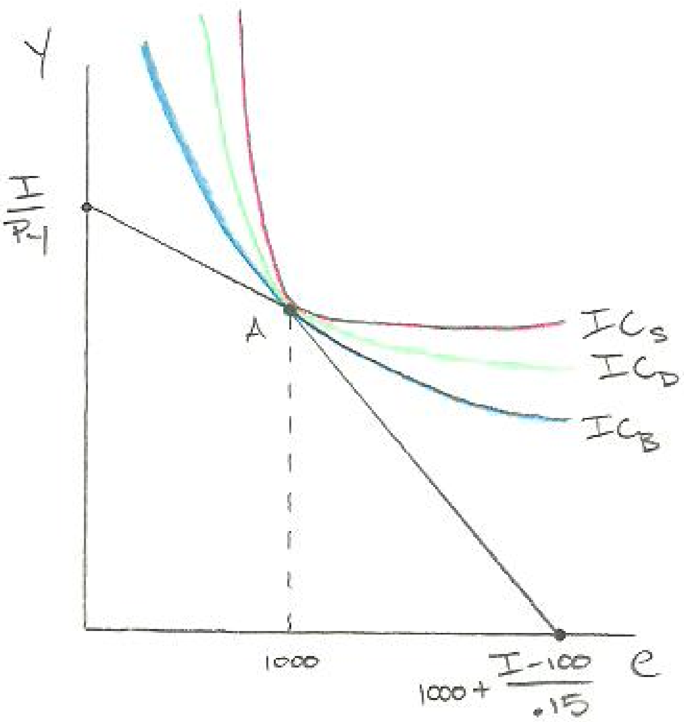
- This space is filled with different levels of Indifference Curves!
- An individual's IC is shaped based on their utility function.



- Different individuals have different utility functions, so their ICs will look different.

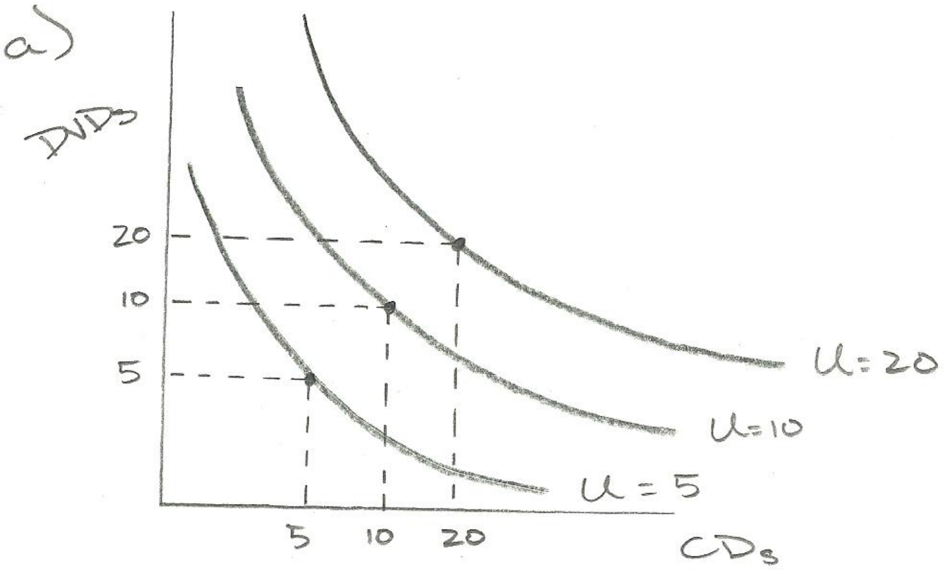






- Many individual's IC can be to point A because the BC is "kinked" at that point.

③ a)



- We know the points (5,5), (10,10), and (20,20) lie on $U=5$, $U=10$, and $U=20$, respectively, because of the utility function:

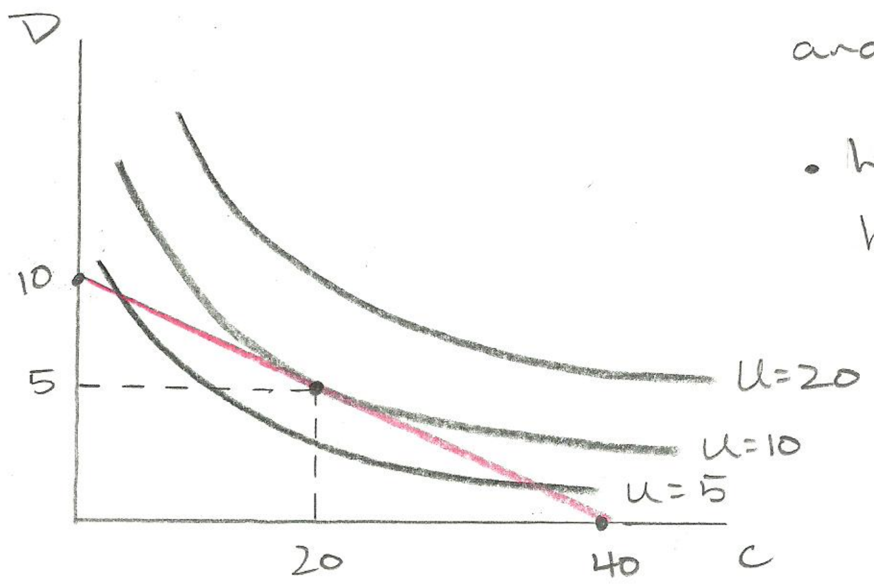
$$U = (CDs \cdot DVDs)^{1/2} \Rightarrow (5 \cdot 5)^{1/2} = 5 \quad \text{etc...}$$

b) Budget Constraint: $I = P_D \cdot D + P_C \cdot C$

$\Rightarrow \$200 = \$20 \cdot D + \$5 \cdot C$

$\Rightarrow D = -1/4 \cdot C + 10$

★ Solve for the Y axis to get the line equation and the correct slope.



- Why $U=10$ is the highest utility level is explained in part f).

c) $200 = 20 \cdot D + 5 \cdot C$

$\Rightarrow 200 = 20 \cdot D + 5(0)$ — buys zero CDs

$\Rightarrow D = 10$, $C = 0$ — plug values into utility fn.

$U = (C \cdot D)^{1/2} = (0 \cdot 10)^{1/2} = 0$ — utility equals zero

d) Paul's budget constraint does not allow him to reach a level of utility above $U = 10$, given his utility function.

e) $200 = 20(5) + 5(C)$

$\Rightarrow C = 20$

f) To achieve maximum utility we need

$$\frac{P_x}{P_y} = MRS = \frac{MU_x}{MU_y} \quad \underline{OR} \quad \frac{P_C}{P_D} = \frac{MU_C}{MU_D}$$

$$\left.\begin{aligned} MU_C &= \frac{\partial U}{\partial C} = \tfrac{1}{2} C^{-1/2} D^{1/2} \\ MU_D &= \frac{\partial U}{\partial D} = \tfrac{1}{2} C^{1/2} D^{-1/2} \end{aligned}\right\} \text{plug in} \Rightarrow \frac{\tfrac{1}{2} C^{-1/2} D^{1/2}}{\tfrac{1}{2} C^{1/2} D^{-1/2}} = \frac{D}{C}$$

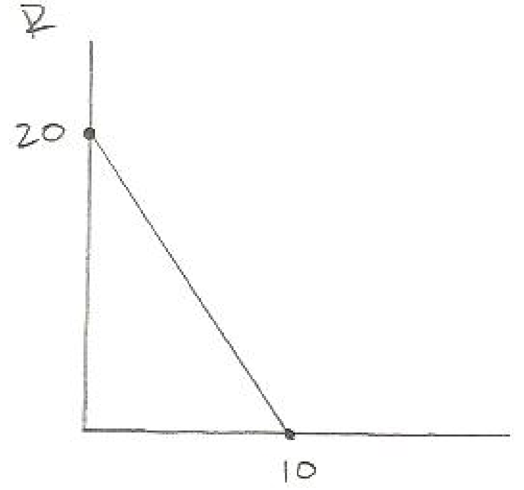
$$\frac{P_C}{P_D} = \frac{\$5}{\$20} = \frac{D}{C} = \frac{MU_C}{MU_D}$$

— The ratio of DVDs to CDs we should buy to maximize utility is $1/4$ OR

We buy 1 DVD with every 4 CDs.

④

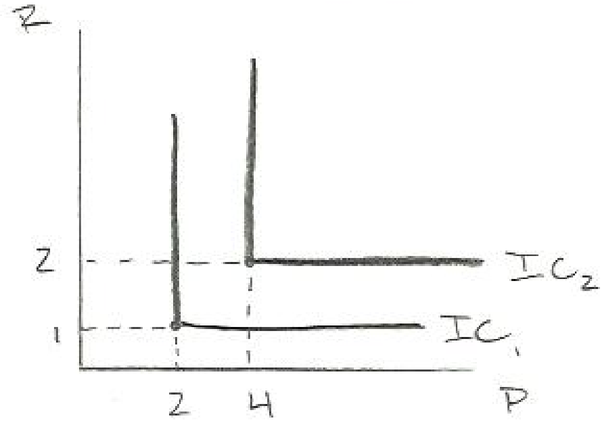
a)



$$\frac{I}{P_R} = \frac{100}{5} = 20$$

$$\frac{I}{P_P} = \frac{100}{10} = 10$$

b) For every 2000 sheets, Sally needs 1 ribbon. Since these are <u>perfect complements</u> the tradeoff is: $2R = P$

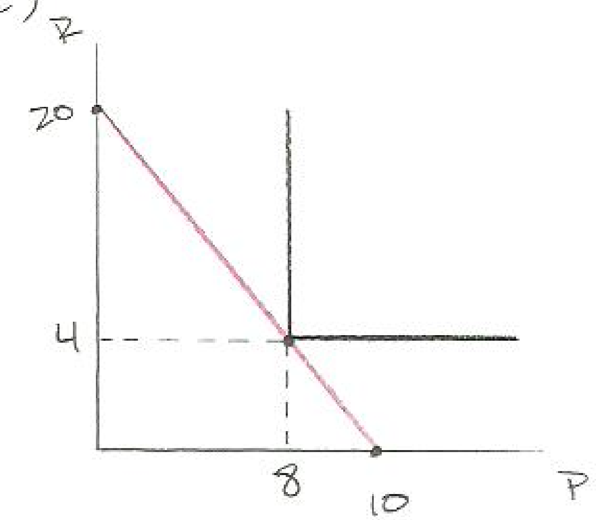


★ Check your answer!

Plug in:

$R=1,\ P=2$
$R=2,\ P=4$ } The equation holds!

c)



$$I = P_P \cdot P + P_R \cdot R$$

$$\$100 = \$10 \cdot 2R + \$5 \cdot R$$

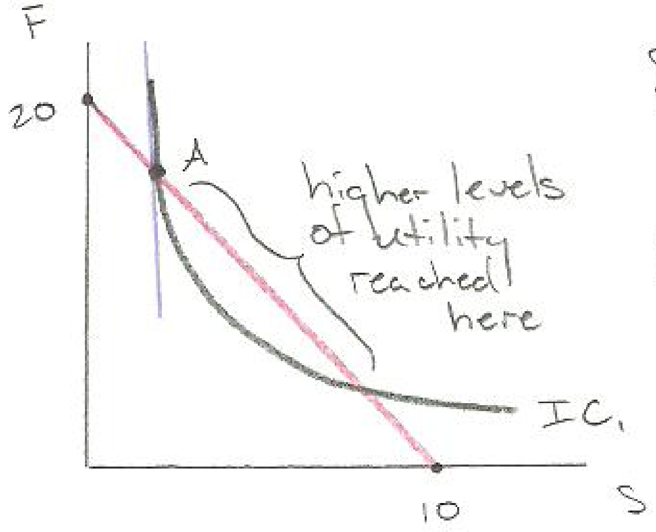
$$100 = \$25R \Rightarrow R = 4$$

Since $2R = P$,

$$2(4) = P = 8$$

So, $R = 4$ & $P = 8$

5)

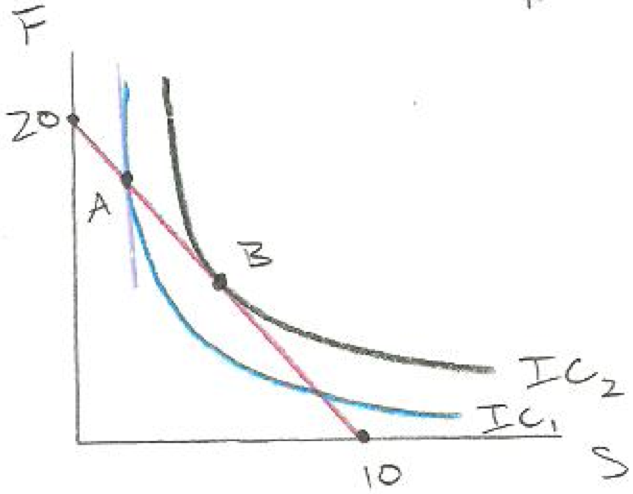


Slope of BC $= \frac{P_S}{P_F} = \frac{\$10}{\$5} = 2$

Slope of IC_1 (@ pt A) $= \frac{MU_S}{MU_F} = 3$

- To achieve the optimal level of utility we want to pick a point on the BC that is tangent to the slope of our IC.

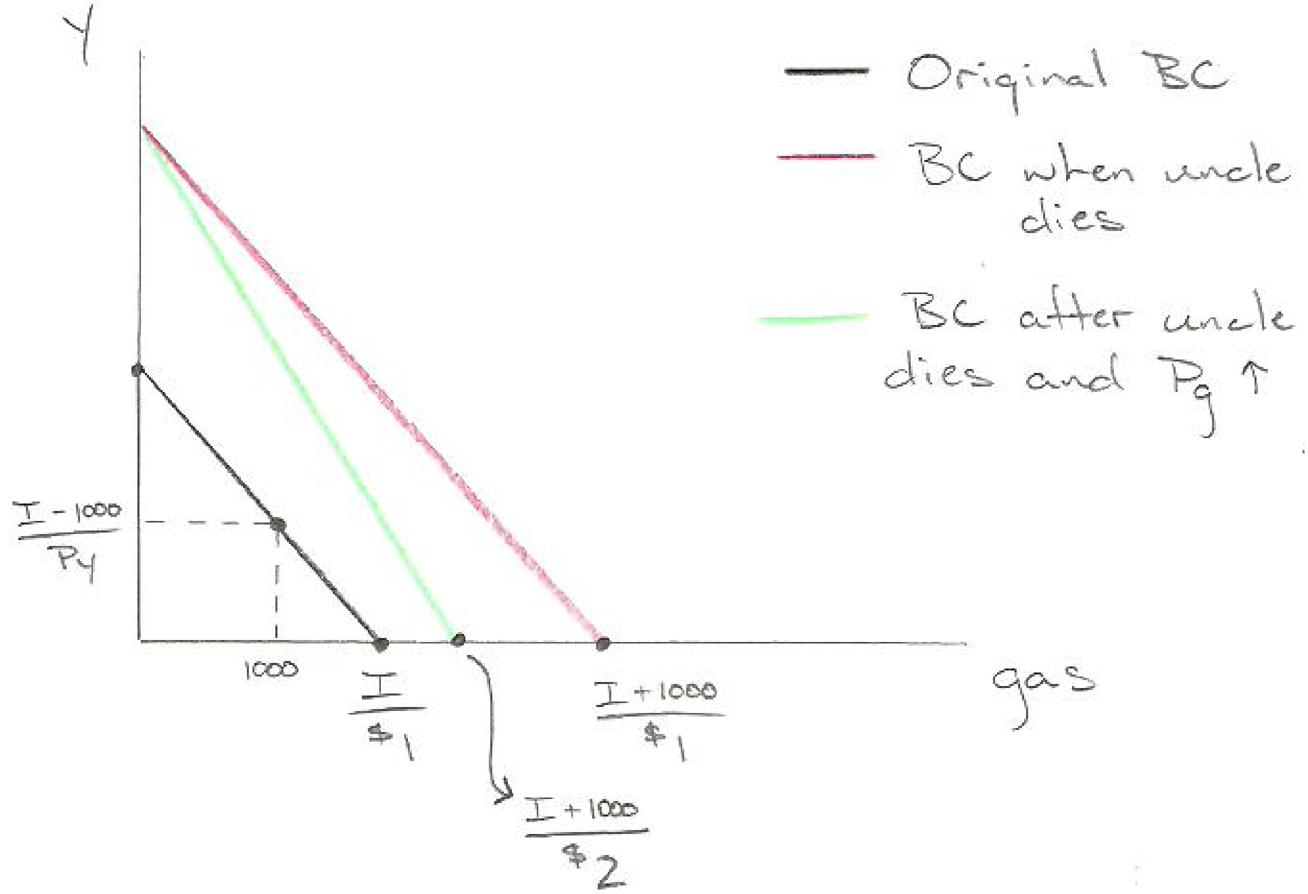
$$\frac{MU_S}{MU_F} = \frac{P_S}{P_F} = 2$$



$IC_2 > IC_1$

- By picking point B, we were able to access the utility level of IC_2 which is higher than that of IC_1.
- And since the slope of IC_2 is tangent to the BC at point B we know this is the highest level of utility we can achieve.

⑥



- The outcome is ambiguous because we don't know...
  - Starting income
  - Utility function
  - The price of good Y

⑦ $P_F \cdot Q_F = .5I$

- If the $P_F \uparrow$ then the $Q_F \downarrow$
- A change in P_F will NOT change total spending Jennifer ALWAYS spends $.5I$.
- If $P_F \uparrow$ by 10% then I must $\uparrow$ by 10% to keep Q_F constant.

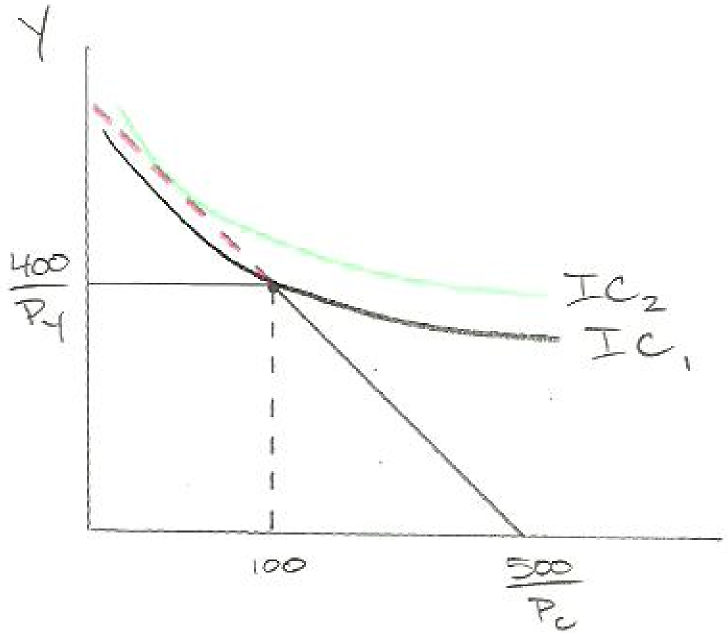
$$\bar{Q}_F = \frac{.5I}{P_F} = \frac{.5(xI)}{(1.10 \cdot P_F)} = \frac{x}{1.10} \times \frac{.5I}{P_F}$$

$X = 1.10$ or 10% $\uparrow$ in order to keep $\bar{Q}_F$ constant

(8) When right shoes become less expensive relative to left shoes, we do NOT substitute away from buying left shoes and buy more right shoes.

We do feel more wealthy, however, which is why there is an income effect.

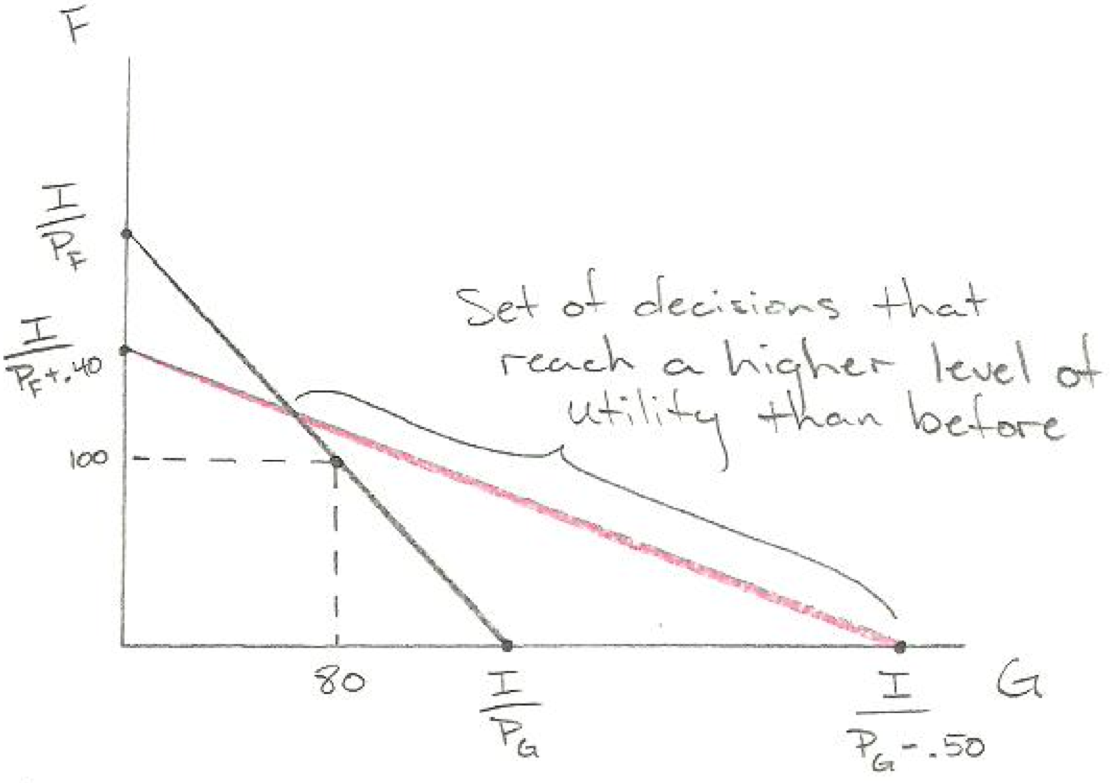
(9)



$IC_2 > IC_1$

- When Mr. Wright isn't restricted by his employer he can access --- choices on his BC he couldn't before.
- These new choices may be associated which a slope of tangency on a higher IC.

(10)



- Without knowing what the utility function looks like, we can NOT tell if Pete buys more, less, or the same amount as before.

$$\frac{P_G-.50}{P_F+.40} = MRS$$

- Don't know the MRS or P_G & P_F.

(11) a) Yes

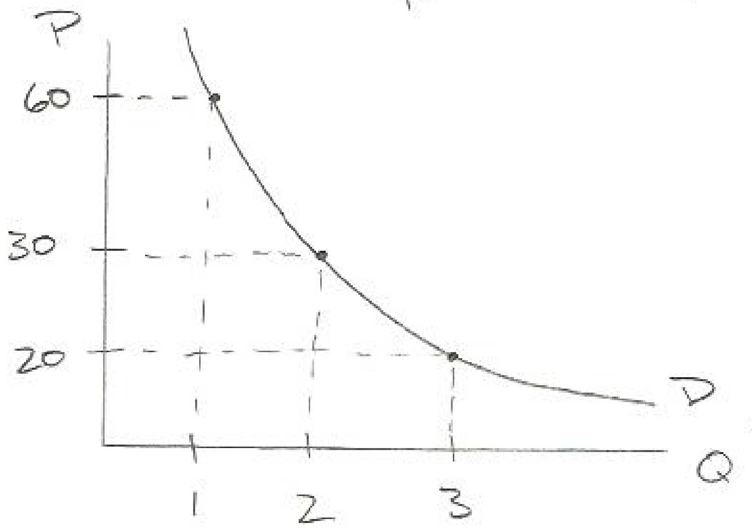
* A Counter-Example: Let's say $Q = \frac{.3I^2}{P}$

$$Q = \frac{.3I^2}{P} = \frac{.3(2I)^2}{(2P)} = \frac{.3(4)I^2}{2P} = \frac{.6I^2}{P} \neq \frac{.3I^2}{P}$$

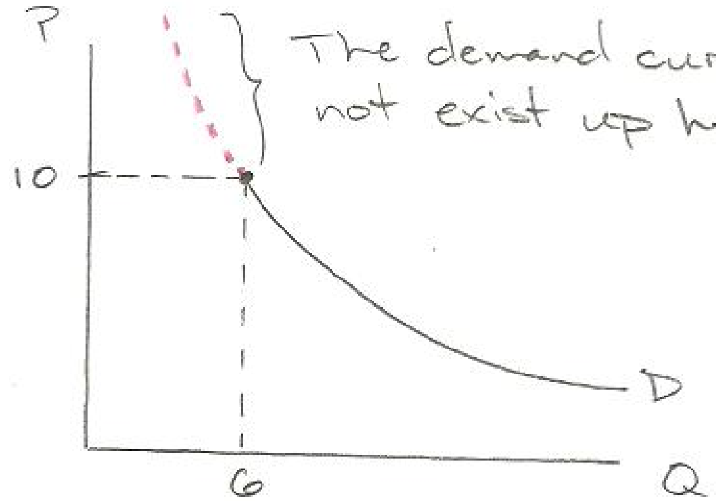
- This is an example of when the function is NOT homogeneous in I and P.

⑪ Continued...

b) $Q = \frac{.3(200)}{P} = \frac{60}{P}$ — Plug in some prices and graph



c)



The demand curve does not exist up here where $P > \$10$.

d) $CS = 198 - 6(10) - 60\ln(10)$

$CS \approx 0$

e) $CS = 198 - 6(3) - 60\ln(3) \approx 114$

$Q = \frac{.3(200)}{3} = 20$

- $CS \approx 114$ is the representation of the additional satisfaction Irene got b/c $P = 3$.