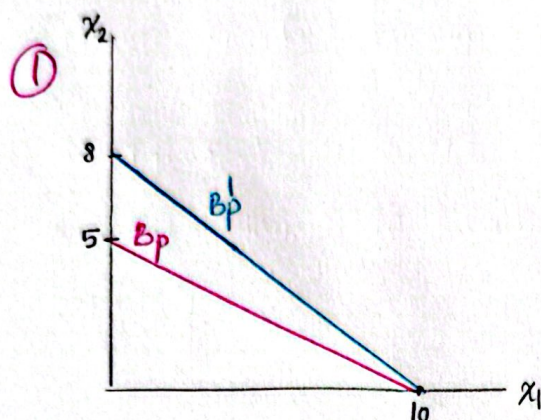


PS #2 Suggested Solutions



- Originally, the consumer's budget constraint is $10x_1 + 20x_2 \leq 100$.

The budget line has horizontal intercept

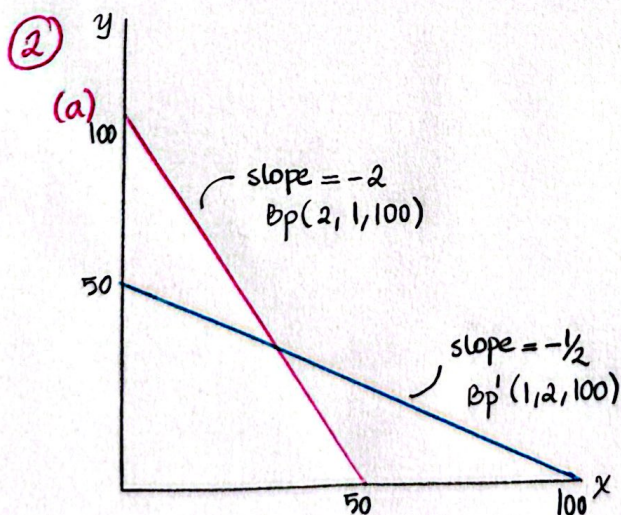
$$\frac{m}{P_1} = \frac{100}{10} = 10 \text{ and vertical intercept}$$

$$\frac{m}{P_2} = \frac{100}{20} = 5. \text{ After the change, her budget}$$

constraint becomes:

$$20x_1 + 25x_2 \leq 200.$$

and so the new budget line has horizontal intercept $\frac{m}{P_1} = \frac{200}{20} = 10$ (the same as before) and vertical intercept $\frac{m}{P_2} = \frac{200}{25} = 8$ (higher than before), and so, the consumer's budget set has grown: she can now afford bundles she previously could not, and she can still afford all bundles she previously could. Therefore she is better off.



- The new budget line is shown as the blue line.

$$B_p: 2x + y \leq 100$$

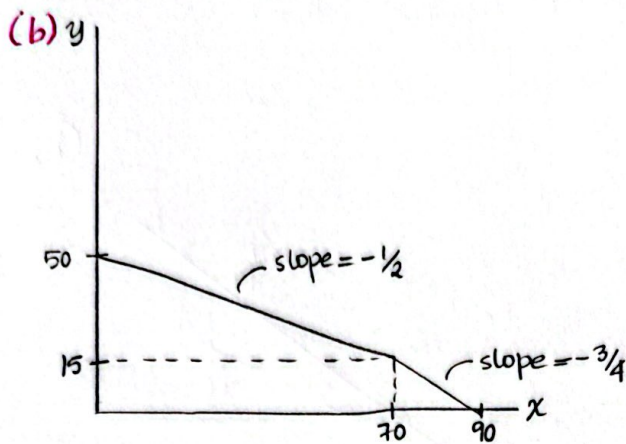
$$x=0 \Rightarrow y=100$$

$$y=0 \Rightarrow x=50$$

$$B_p': x + 2y \leq 100$$

$$x=0 \Rightarrow y=50$$

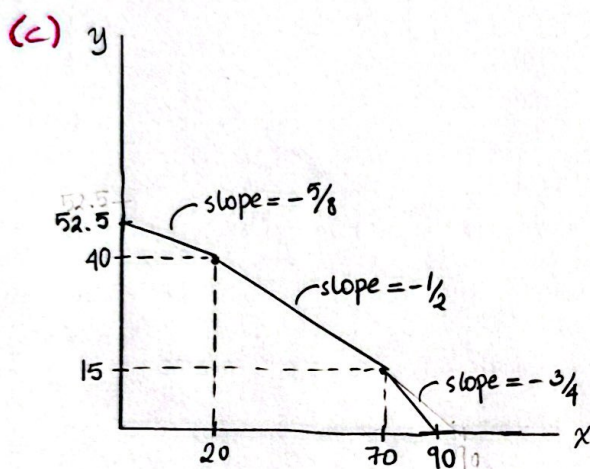
$$y=0 \Rightarrow x=100$$



• $P_x^{\text{new}} = 1$ for the first 70 units, there is no tax. For each additional unit good x purchased after 70 units, consumers pay \$0.50 per unit tax. There is no tax on the second good. This is shown in the figure.

- For $x \leq 70$ $P_x = 1$ & $P_y = 2$

- For $x > 70$ $P_x' = 1.5$ & $P_y = 2$



• $P_y^{\text{new}} = 2$ for the first 40 units, there is no subsidy. For each additional good y purchased after 40 units, consumers pay \$1.60. This is shown in the figure.

- For $x \leq 70$ and $y > 40$ $P_x = 1$ & $P_y = 1.60$

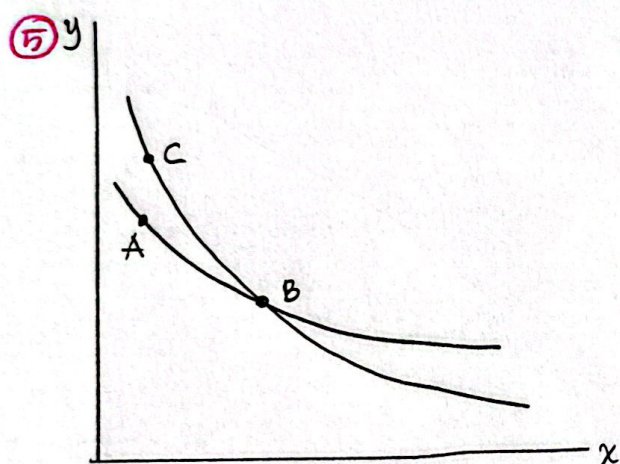
- For $20 \leq x < 70$ and $y \leq 40$ $P_x = 1$ & $P_y' = 2$

- For $x > 70$ & $y < 40$ $P_x' = 1.5$ and $P_y' = 2$

③ No, because the preferences are not complete as we don't know the preferences between any of B_1, B_2, B_3 and any of B_4, B_5 . Once we have the information $B_5 > B_1$, now we have complete preferences. These preferences are also transitive as we have the ranking $B_4 > B_5 > B_1 > B_2 \sim B_3$. Since the preferences are both complete and transitive, there exists a utility function that represent these preferences, for instance, $u(B_4) = 20$, $u(B_5) = 15$, $u(B_1) = 1$, $u(B_2) = 0$ and $u(B_3) = 0$.

④ Let R denote the relation. Note that a relation R is a subset of $A \times A$ (Cartesian Product) where $A \neq \emptyset$.

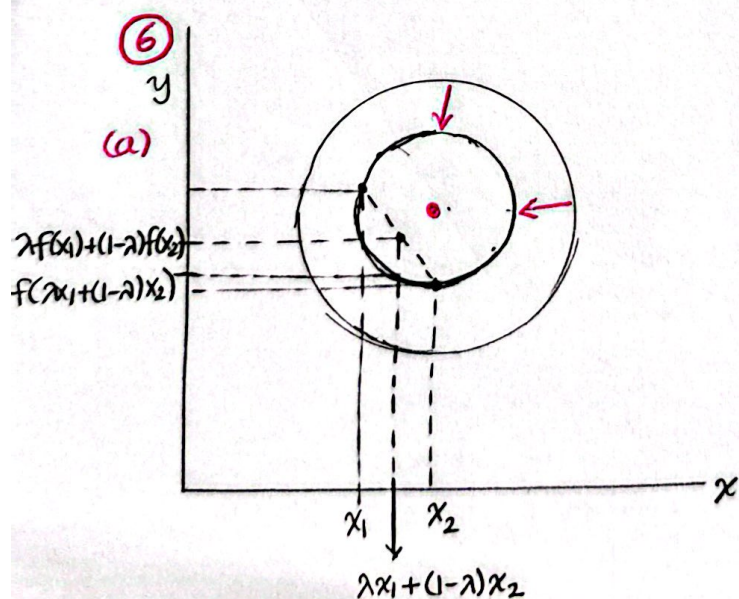
- Reflexivity: R is not reflexive since person P cannot be "a full brother" of himself/herself. So PRP is not possible.
- Transitivity: R is transitive since if person P is a "full brother" of Y and person Y is a full brother of person Z , then this implies P and Z are also brothers. PRY and $YRZ \Rightarrow PRZ$
- Completeness: R is not complete. Within a population, we cannot define this kind of relation between individuals who are not brothers. That is, if person P and person Y are not brothers, then we do not have PRY or YRZ .



- No, her indifference curves cannot cross. To prove, let's assume they cross. Since they are on the same indifference curve, $A \sim B$ and similarly $B \sim C$. Transitivity implies $A \sim C$.

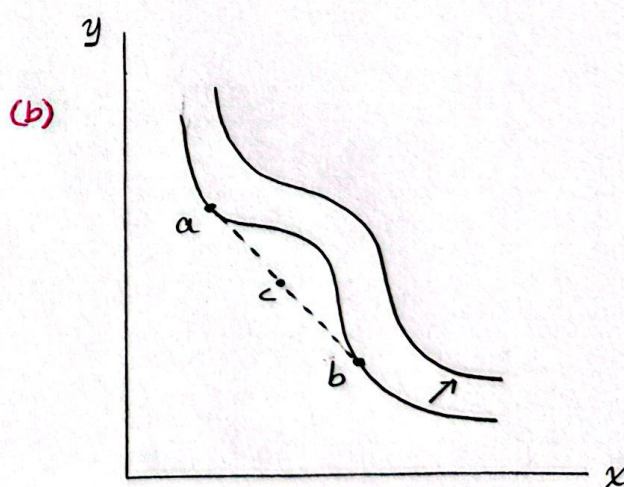
However, $C \succ A$ since C is a bundle with more of both commodities compared to A .

Contradiction $\Rightarrow$ indifference curves cannot cross.



- Convex but not monotonic

$$f(\lambda x + (1-\lambda)y) \leq \lambda f(x) + (1-\lambda)f(y)$$



- monotonic but not convex

③