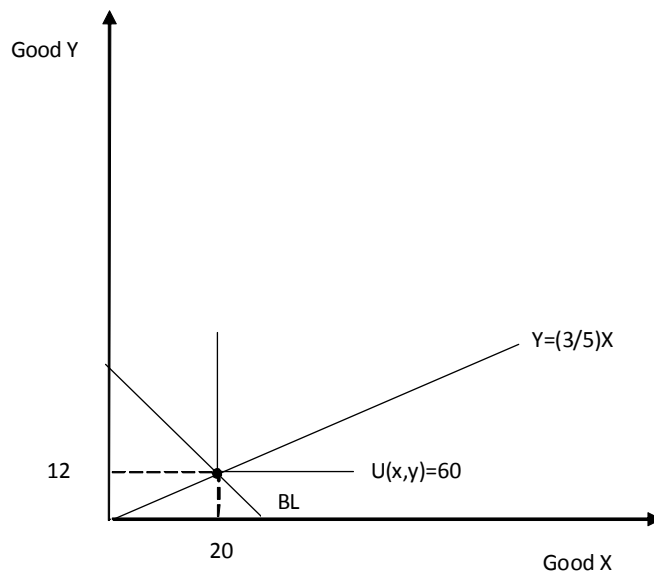


Econ 30010
Intermediate Microeconomic Theory

Answers to Chapter 4 Problems

3. When a utility function contains the *min* operator, the marginal utility with respect to each good is not defined at bundles for which the goods are consumed in the "ideal" proportions. For this problem, notice that for every 5 units of good x this consumer requires 3 units of good y to ensure that no units of either good are wasted. At any bundle that consists of goods x and y in exactly these proportions, e.g. (5,3), (15,9), or (2.5,1.5), the marginal utility of one more unit of either good is 0 while the marginal utility of one less unit is infinity. The graph below reveals that when the goods are perfect complements, the indifference curves will be L-shaped and the optimal bundle must fall on the kink of an indifference curve. Since the kink of each indifference curve corresponds to a bundle with the "ideal" proportion of x to y , one can find the optimal bundle by replacing the marginal value equation with an equation that describes the "ideal" proportion, i.e., $3x = 5y$. Solving this equation simultaneously with the budget line equation, $5x + 10y = 220$, implies that $x^* = 20$ and $y^* = 12$.



5. We first need to calculate the price of hamburgers. Since Ray spends \$40 a week on root beer (20 bottles * \$2 per bottle), he has \$60 remaining. If he consumes 15 hamburgers a week, the price of hamburgers must then be \$4 (\$60/ 15 hamburgers).

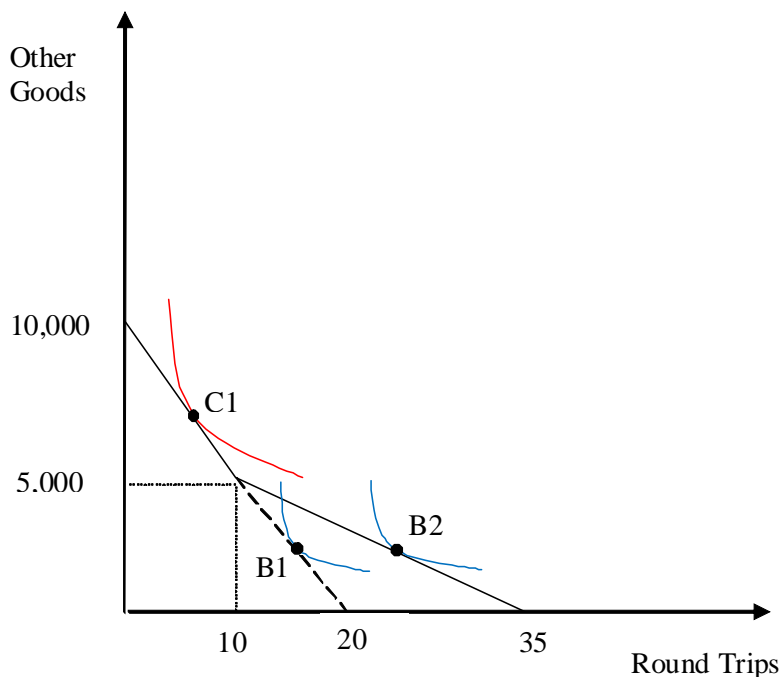
Now, If Ray is maximizing his utility by consuming positive amounts of both goods, the tangency condition must hold:

$$\frac{P_H}{P_{RB}} = MRS_{H, RB}(H, RB).$$

Given the information in the problem, $P_H/P_{RB} = 2$ while $MRS_{H, RB} = 8/6 = 4/3$. This means Ray is not currently maximizing his utility. The value of his marginal rate of substitution of hamburger for root beer tells us that he is willing to give up no more than $4/3$ bottles of root beer to get an extra hamburger. The relative price of hamburgers tells us that the market requires Ray to give up 2 bottles of root beer to afford an extra hamburger. This means Ray is consuming too many hamburgers and too few bottles of root beer.

10.

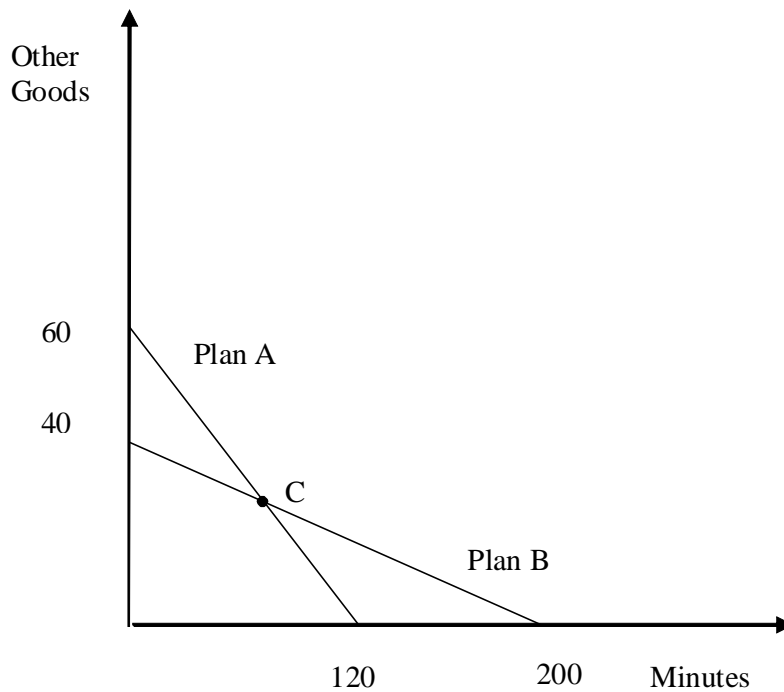
a) See graph below. Notice that at 10 trips, the budget line becomes flatter.



b) The blue indifference curves describe preferences for Toni under which she would benefit from the frequent flyer program. At B1, Toni would take more than 10 trips without the program so under the frequent flyer program, she optimizes at B2 and achieves greater utility.

c) The red indifference curve describes preferences under which Toni would not benefit from the program because at C1 she is taking significantly less than 10 trips. Toni is no better off with the frequent flyer program than without it.

22.



We want to find the bundle, C, which has the same cost under both plans. If Q equals the number of minutes used then at C, $20 + .2Q = .5Q$. Thus, $Q = 200/3$.

If Plan A is better for him, he will purchase a bundle with $Q < 200/3$, and if plan B is better for him, he'll purchase a bundle with $Q > 200/3$.