Microeconomics for Public Policy
Fall 2017

Problem Set 5
Due Lecture 6 in class on paper

1. GLS Chapter 5, Question 4

(a) If Kim is maximizing her utility, then it must be the case that

$$\frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

Plugging in what's given from the problem, we can write

$$\begin{aligned} \frac{Y}{X} &= \frac{6}{3} \\ \frac{Y}{X} &= 2 \\ Y &= 2X \end{aligned}$$

For every 1 unit of X Kim consumes, she likes to have two units of Y. So, if Kim consumed 3 units, she'd consume one-third (33%) X and two-thirds (66%) Y.

Note that this doesn't depends on consuming three units. If Kim consumed 8 units, she'd like 4 of X and 8 of Y; again ($\frac{4}{12} = \frac{1}{3}$, and $\frac{8}{12} = \frac{2}{3}$).

(b) If the price of Y increases to 4, we can re-write the optimal condition as

$$\begin{aligned} \frac{MU_X}{MU_Y} &= \frac{P_X}{P_Y} \\ \frac{Y}{X} &= \frac{6}{4} \\ \frac{Y}{X} &= 1.5 \\ Y &= 1.5X \end{aligned}$$

Now for every 1 unit of X Kim consumes, she likes to have 1.5 units of Y. To make the numbers easier, assume that Kim consumes 4 units of X and therefore 6 units of Y. This is 40% of her consumption in good X and 60% in good Y.

2. GLS Chapter 5, Question 9

(a), (b), (c), (d) Please see picture at the end and table below.

	Total	Subst.	Income	Type of Good
Bob	4	1	3	normal
Carol	1	2	-1	inferior
Ted	1	1	0	income inelastic

3. GLS Chapter 5, Question 18

(a) For me, the easiest way to get the algebra right is to first draw the three individual demand curves. By doing this, you'll see that no-one is willing to pay more than \$6, and that the total market demand when $P = 0$ is 15. You can use both of these as useful checks on your work.

Again, by referring to your picture, you can see that for prices greater than 5, only Cooper is in the market. For prices between 3 and 5, both Carlene and Andre are in the market. For prices of 4 and below, all three people are in the market.

$$Q_T = \begin{cases} Q_C, & 5 \leq P < 8 \\ Q_C + Q_A, & 3 \leq P < 5 \\ Q_C + Q_A + Q_R, & 0 \leq P < 3 \end{cases}$$

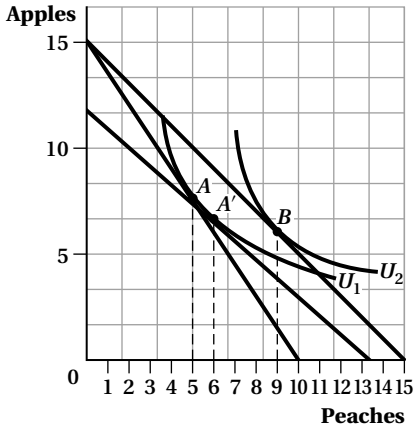
which can be written as

$$Q_T = \begin{cases} 4 - (1/2)P, & 5 \leq P < 8 \\ 9 - 1.5P, & 3 \leq P < 5 \\ 15 - 3.5P & 0 \leq P < 3 \end{cases}$$

(b) See picture at end.

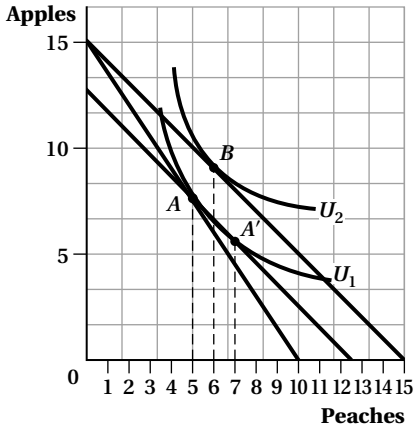
9. a. When the price of peaches falls to \$2, Bob consumes 9 peaches and 6 apples.

(a) Bob



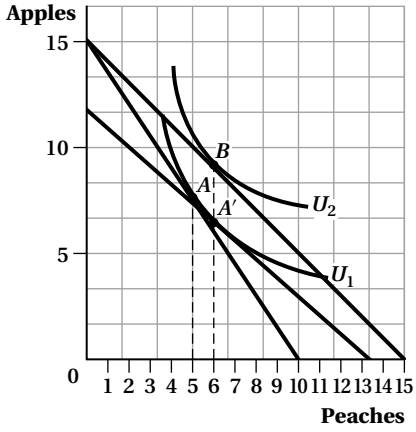
When the price of peaches falls to \$2, Carol consumes 6 peaches and 9 apples.

(b) Carol



When the price of peaches falls to \$2, Ted consumes 6 peaches and 9 apples.

(c) Ted



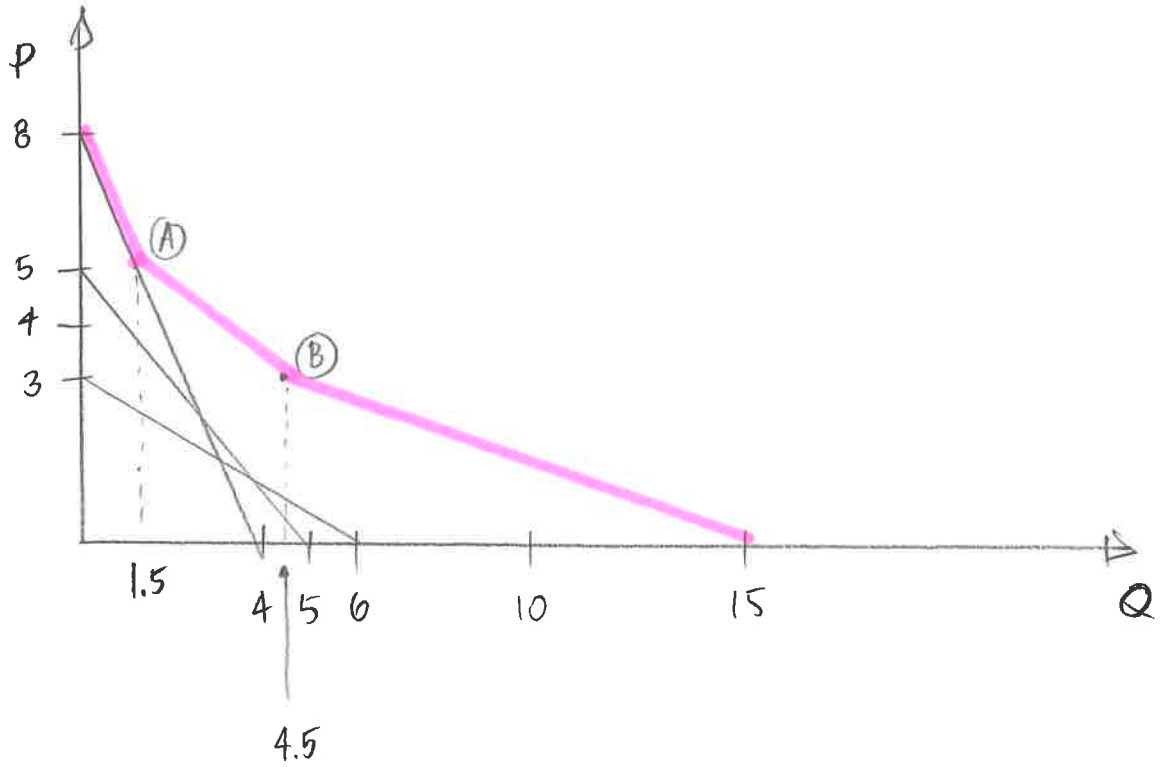
b. For Bob, the substitution effect is $6 - 5 = 1$. For Carol, the substitution effect is $7 - 5 = 2$. For Ted, the substitution effect is $6 - 5 = 1$.

Chapter 15, Q18

$Q_A = 5 - P$, $P = 0 \Rightarrow Q_A = 5$, $Q_A = 0 \Rightarrow P = 5$

$Q_R = 6 - 2P$, $P = 0 \Rightarrow Q_R = 6$, $Q_R = 0 \Rightarrow 2P = 6 \Rightarrow P = 3$

$Q_C = 4 - \frac{1}{2}P$, $P = 0 \Rightarrow Q_C = 4$, $Q_C = 0 \Rightarrow \frac{1}{2}P = 4 \Rightarrow P = 8$



Find point (A) by plugging in a price of 5 into market demand curve.

$Q = 9 - 1.5(P) = 9 - (1.5)(5) = 1.5$ OR $Q = 4 - \frac{1}{2}P = 4 - \frac{1}{2}(5) = 1.5$

Find point (B) by plugging in a price of 3 into market demand curve

$Q = 15 - 3.5(P) = 15 - 3.5(3) = 15 - 10.5 = 4.5$

or

$Q = 9 - (1.5)P = 9 - (1.5)3 = 9 - 4.5 = 4.5$