



EE 211 Principles of Microeconomics

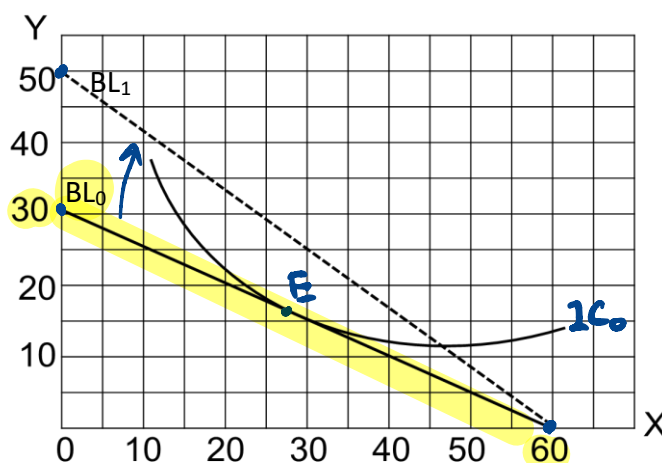
Homework Assignment #2

Instructions (Please read carefully.)

1. You can either write your answers on papers and take pictures of your answers, or write them using a tablet. In either case, you need to save all pages in ONE single pdf-file and name your file in the following format: Firstname_studentID_HW2.pdf. For instance, Phatta_640464xxxxx_HW2.pdf.
2. You have until October 29, 2021 to complete your assignment. Please upload your answers BEFORE 12: 59 pm.

Part 1 (Total 10 points)

Suppose a consumer spends all of his income on two goods, X and Y, and the price per unit of each good is given by $P_x = \$5$ and $P_y = \$10$, respectively. Correspondingly, his budget line is BL_0 (solid line) as shown in the figure below.



$$BL: \\ P_x \cdot X + P_y \cdot Y = I \\ 5 \cdot (60) + 5 \cdot (0) = I \\ I = 300$$

1. (2 points) Based on the budget line BL_0 , determine this consumer's total income.

$$P_x = 5, X_{max} = 60 \Rightarrow \text{Total income} = \$5 \times 60 = \$300. \\ (\text{or, } P_y = 10, Y_{max} = 30 \Rightarrow \text{Total income} = \$10 \times 30 = \$300).$$

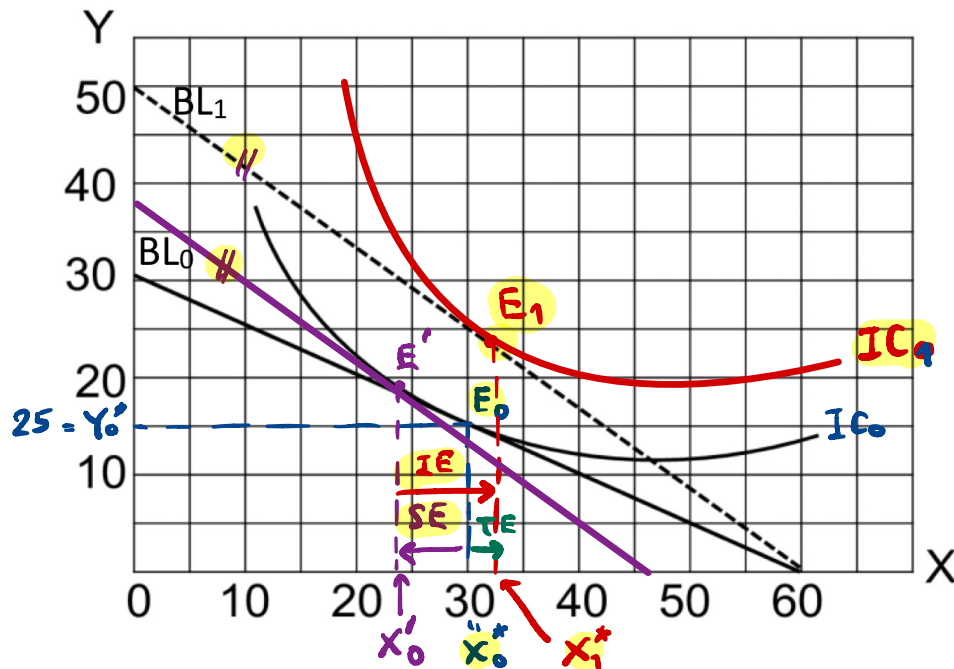
2. (2 points) Suppose now that price of good Y decreases, everything else constant.

Accordingly, the budget line changes to BL_1 (dotted line). Based on the given information, what is the new price of good Y?

$$Y = 300, Y_{max} = 50 \\ \Rightarrow P_y' = \frac{\$300}{50} = \$6.$$

$$\begin{cases} P_x \cdot X + P_y \cdot Y = I \\ 50 \cdot P_y = 300 \\ P_y = \frac{300}{50} = 6 \end{cases} \quad @ (0, 50)$$

3. (4 points) Given the reduction in the price of good Y, draw an indifference curve to illustrate the new equilibrium a new diagram. Then, use Hicksian approach to illustrate the substitution effect and income effect of this price change on the optimal consumption of good X. Also, indicate the direction of each effect.



Substitution effect = $x'_0 - x_0^* < 0$

Income effect = $x_1^* - x'_0 > 0$

} total effect
= $x_1^* - x_0^* > 0$

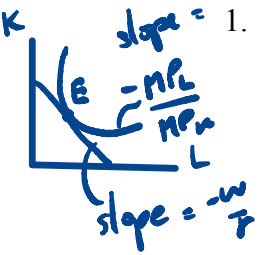
4. (2 points) Is good X a normal good or an inferior good?

Normal good b/c as income increases, demand for good X increases.

Cost-minimization $\begin{cases} \textcircled{1} \bar{Q}_0 = f(L, K) \\ \textcircled{2} |MRTS| = \frac{w}{r} \end{cases}$

Part 2 (Total 10 points)

Consider a long-run production in which there are only two inputs labor and capital, and the input prices for labor and capital are wage (w) and interest rate (r), respectively. Suppose that at the equilibrium levels of labor and capital (L^*, K^*), the marginal product of labor (MP_L) and marginal product of capital (MP_K) are 12 and 16, respectively.



1. (3 points) Calculate the marginal rate of technical substitution (MRTS), and state the cost-minimization conditions of this firm, given that the required output is fixed at Q_0 .

$$MRTS = \frac{MP_L}{MP_K} = \frac{-12}{16} = -\frac{3}{4}$$

Cost-minimization condⁿ: $\frac{MP_L}{MP_K} = \frac{w}{r} \Leftrightarrow \frac{MP_L}{w} = \frac{MP_K}{r}$

2. (2 points) If the market wage rate (w) is \$9, what is the interest rate (r) at the equilibrium?

$$\frac{MP_L}{MP_K} = \frac{w}{r} \Leftrightarrow \frac{3}{4} = \frac{9}{r} \Rightarrow r = 12$$

3. (5 points) Suppose now that the wage rate (w) increases to \$13, *ceteris paribus*. Draw a diagram to illustrate the changes in the cost-minimizing combination of inputs.

BY $r \geq Q$ are same.
 $w' = 9 + 4 = 13 \Rightarrow \frac{w'}{r} = \frac{13}{12} > 1$

\therefore As $w \uparrow$,
 $L^* \downarrow, K^* \uparrow$.

