

EconS 301

Written Assignment #3

Due date: September 29th, 2016, in class.

Exercise #1. Consider a consumer with Cobb-Douglas utility function

$$u(x_1, x_2) = x_1^{1/3} x_2^{2/3}$$

Assume that the consumer faces a price of \$1 for good 2, and a total income of \$100. The price of good 1 decreases from \$4 to \$2. We next analyze the substitution and income effect of this price change.

- a) Find the optimal consumption bundle at the *initial* price of \$4. Label it bundle A.
- b) Find the optimal consumption bundle at the *final* price of \$2. Label it bundle C.
- c) What is the total effect of the price change?
- d) We next seek to disentangle the total effect you found in part (c) into the substitution and income effects. In order to do that, let us start by finding the decomposition bundle. Label it bundle B. [*Hint*: Recall that the decomposition bundle must satisfy two conditions: (1) it must generate the same utility level as the initial bundle A; and (2) we must have a that the slope of the consumer's indifference curve, *MRS*, coincides with the new price ratio.]
- e) Write the amount of good 1 that this individual consumes on bundles A, B and C. What is the increase in consumption of good 1 due to the substitution effect? What is due to the income effect?
- f) Using the sign of the income effect, what can you say about good 1? Is it a normal, or an inferior good?

Exercise #2. Consider a consumer with the following quasi-linear utility function

$$u(x_1, x_2) = x_1^2 + 5x_2$$

Assume that the consumer faces a price of \$1 for good 2, and a total income of \$120. The price of good 1 decreases from \$4 to \$2. We next analyze the substitution and income effect of this price change.

- a) Find the optimal consumption bundle at the *initial* price of \$4. Label it bundle A.
- b) Find the optimal consumption bundle at the *final* price of \$2. Label it bundle C.
- c) What is the total effect of the price change?
- d) We next seek to disentangle the total effect you found in part (c) into the substitution and income effects. In order to do that, let us start by finding the decomposition bundle. Label it bundle B. [*Hint*: Recall that the decomposition bundle must satisfy two conditions: (1) it must generate the same utility level as the initial bundle A; and (2) we must have a that the slope of the consumer's indifference curve, *MRS*, coincides with the new price ratio.]
- e) Write the amount of good 1 that this individual consumes on bundles A, B and C. What is the increase in consumption of good 1 due to the substitution effect? What is due to the income effect?
- f) Using the sign of the income effect, what can you say about good 1? Is it a normal, or an inferior good?

Exercise #3. Consider a consumer with Cobb-Douglas utility function

$$u(x_1, x_2) = x_1^{1/2} x_2^{1/2}$$

Assume that the consumer faces a price of \$1 for good 2, and a total income of \$150. However, unlike in previous exercises, we now observe that the price of good 1 *increases* from \$2 to \$3. We next analyze the substitution and income effect of this price change.

- a) Find the optimal consumption bundle at the *initial* price of \$2. Label it bundle *A*.
- b) Find the optimal consumption bundle at the *final* price of \$3. Label it bundle *C*.
- c) What is the total effect of the price change?
- d) We next seek to disentangle the total effect you found in part (c) into the substitution and income effects. In order to do that, let us start by finding the decomposition bundle. Label it bundle *B*. [*Hint*: Recall that the decomposition bundle must satisfy two conditions: (1) it must generate the same utility level as the initial bundle *A*; and (2) we must have a that the slope of the consumer's indifference curve, *MRS*, coincides with the new price ratio.]
- e) Write the amount of good 1 that this individual consumes on bundles *A*, *B* and *C*. What is the increase in consumption of good 1 due to the substitution effect? What is due to the income effect?
- f) Using the sign of the income effect, what can you say about good 1? Is it a normal, or an inferior good?