Econ 3012 - Midterm Exam

October 15, 2020

1. *Briefly describe the following in a way that a person who **has not studied economics or mathematics would understand**:*

A. What is a **Utility Function**?

A numerical representation of a consumer's preferences (or similar).

B. What are **Convex Preferences**?

Preferences for which intermediate bundles are better than extreme bundles.

C. What is the **Income Effect** associated with a change in demand**?**

The change in demand for a good associated with the fact that an increase in price reduces the effective value of a consumer's income.

2. *A consumer is deciding how much of her income to spend this month c_1 and next month c_2. Her income this month is $m_1 = 1000$ and next month it be $m_2 = 1420$. She can borrow or save at an interest rate of $r = 0.1$.*

A. How much could she consume next month if she only consumed next month?

$1000\,(1.1) + 1420 = 2520$.

B. How much money could she spend each month if she chose to spend the *same amount of money* this month and next month $c_1 = c_2$.

1200

C. In this case, would she be a borrower or a saver?

Borrower since $c_1 > m_1$

D. Suppose $c_1 = c_2$ is optimal for her, but then interest rate goes down, is she better off or worse off? *How do you know?*

Better off. A bundle is available to her that contains more consumption in both periods. (or similar)

E. Demonstrate the it is optimal for a consumer with the following utility function to consume where $c_1 = c_2$ when $r = 0.1$

$$u = \left(c_1^{1.1}\right)\left(c_2^1\right)$$

The place where the MRS is equal to the price ratio $(1 + r)$ is:

$$\frac{1.1c_2}{c_1} = 1.1$$

This is

$$c_1 = c_2$$

3. *A consumer has demands* $x_1 = \frac{m}{p_1+p_2}$ *and* $x_2 = \frac{m}{p_1+p_2}$.

A. Is x_1 a normal or inferior good? *How do you know?*

Normal as x_1 is increasing in m (it only appears in the numerator). Similarly, derivative is $\frac{1}{p_1+p_2} > 0$.

B. Are x_1 and x_2 complements or substitutes? *How do you know?*

They are complements. x_1 is decreasing in p_2 and vise versa. One might note for instance: $\frac{\partial \frac{m}{p_1+p_2}}{\partial p_2} = -\frac{m}{(p_1+p_2)^2} < 0$

C. Sketch this consumer's Engel curve for x_1. *Make sure to label the axes.*

It is a line through the origin with slope $\frac{1}{p_1+p_2}$.

This consumer faces prices $p_1 = 1$ *and* $p_2 = 1$ *and income* $m = 12$, *but then the price of* x_1 *changes to* $p_1 = 2$.

D. What is the total change in demand for good 1 due to this price change?

Changes from 6 to 4. Change in demand is 2.

E. What portion of this change in demand is due to the *income effect*?

It is all due to income effect.