

Econ 8100 - Midterm Exam

October 14, 2020

1. A consumer faces prices $p_1 = p_2 = p_3 = 1$. This consumer must consume non-negative amounts of each good and has the utility function:

$$U(x_1, x_2, x_3) = (x_1 - 1)(x_2)(x_3 + 1)$$

A) Prove this consumer's preferences do not meet the following property:

$$\text{Homotheticity: } x \sim x' \Rightarrow tx \sim tx' \forall t > 0$$

For parts B-E, assume $m > 1$ and make sure your answers account for different conditions relating to m .

B) What are the optimal choices of x_1, x_2, x_3 ?

C) Write down an expression for the value of the multiplier on the budget constraint in the consumer's Lagrangian function in this problem. Interpret this multiplier and the expression.

D) Write down the indirect utility function.

E) What is the elasticity of demand with respect to income for each good? Interpret the values. Under what conditions are they greater than, equal to, or less than one?

F) What happens in this problem if $m < 1$?

2. Discuss, in a few paragraphs how the consumer from the previous problem behaves in relation to a consumer with utility function $U(x_1, x_2, x_3) = x_1 x_2 x_3$.

3. A consumer with locally non-satiated and strictly convex preferences has the following expenditure function:

$$e(p_1, p_2, u) = u(p_1^\alpha + p_2^\alpha)^{\frac{1}{\alpha}}$$

- A) Find the consumer's Indirect Utility function.
- B) Find the consumer's Marshallian Demands.
- C) Show that the above expenditure function with $\alpha = 2$ is not a valid expenditure function because it violates some property of true expenditure functions.
- D) What does this violation have to do with the substitution effect?