

## 8100 Problem Set 4.

October 7, 2021

1. *The utility function appeared on my prelim exam and is permanently seared into my brain. Beware of the corners.*

Find the Marshallian demand for the utility function:

$$(x_1 - a)^\alpha (x_2 - b)^\beta (x_3 - c)^\gamma$$

Assume  $m > p_1a + p_2b + p_3c$  and that  $x_1 \geq a, x_2 \geq b, x_3 \geq c$ .

2. *This is a style of problem that appears on prelim exams in many places because it is trivial to write and tests **a lot** of knowledge, traversing many of the key concepts in consumer theory. Ultimately, it is fairly mechanical to solve assuming you know all the concepts. You can easily create your own problems of this style just by changing the utility function.*

A consumer has utility function:

$$\frac{1}{\frac{1}{x_1} + \frac{4}{x_2}}$$

- A) Find the Marshallian demand.
- B) Find the indirect utility function.
- C) Confirm Roy's Identity holds.
- D) Find the Hicksian demand.
- E) Find the expenditure function.
- F) Confirm Shephard's Lemma holds.
- G) Confirm  $x_1(p, y) = x_1^h(p, v(p, y))$ .

H) Write down an expression that gives the proportion of the total effect that can be explained by the substitution effect for change in demand for  $x_1$  when  $p_1$  changes marginally.

I) Confirm the elasticity relation:  $s_1\epsilon_{1,2} + s_2\epsilon_{2,2} = -s_2$

J) Confirm the elasticity relation:  $s_1\eta_1 + s_2\eta_2 = 1$