Microconomics I, 2024/2025
Master of Science in Economics
Problem Set 4

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Question 1 Consider an economy with $L = 2$. Let the expenditure function for the price profile $(p_1, p_2) >> 0$ and the utility level $\overline{u} \geq 0$, be given by

$$e(p, \overline{u}) = p_1^{\alpha_1} p_2^{\alpha_2} \exp \overline{u},$$

in which $\alpha_1, \alpha_2 \geq 0$ and $\alpha_1 + \alpha_2 = 1$.

1. Find the Hickisian demand of every good.

2. Compute the associated indirect utility function. How does it vary with respect to w?

3. Which property/properties did you use to answer the previous questions?

Question 2 The substitution matrix of a utility-maximising consumer's demand system at prices $(8, p)$ is $S(p, w) = \begin{bmatrix} a & b \\ 2 & -\frac{1}{2} \end{bmatrix}$ Find the values of a, b, p. Explain which properties have you used.

Question 3 Suppose that $f(.)$ is the production function associated with a single-output technology, and let Y be the production set of this technology. Show that if Y satisfies constant returns to scale, $f(.)$ is homogeneous of degree one.

Question 4 Derive the profit function $\pi(p)$ and the supply function $y(p)$ for the single-output technology with production function $f(z) = \sqrt{z_1 + z_2}$.

Question 5 Derive the cost function $C(w, q)$ and the conditional factor demands $z(w, q)$ for the following single-output constant returns to scale technologies with production functions given by:

i) $f(z_1, z_2) = z_1 + z_2$

ii) $f(z_1, z_2) = min\{z_1, z_2\}$

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