Name:

E-mail:

All questions must be answered on this test form!
For each question you must show your work and (or) provide a clear argument.
If you need scratch paper, use the last pages and the back of the form.

Question 1 Suppose that preferences are continuous and locally non satiated. Let $h(p,u)$ be Hicksean demand, $x(p,w)$ Walrasian demand, and $e(p,u)$ and $v(p,w)$ be the expenditure and indirect utility functions, respectively. Simplify each of the following expressions as much as possible: *12 points*

(a) $\boldsymbol{h(p, v(p, w)) =}$.

(b) $\boldsymbol{ph(p, v(p, w)) =}$.

(c) $\boldsymbol{px(p, e(p, u)) =}$.

Question 2 Suppose the Hicksean demand functions are given by

$$h_1(p_1, p_2, u) = \frac{p_2^2}{p_1^2}, \quad h_2(p_1, p_2, u) = u - \frac{2p_2}{p_1}$$

Then Walrasian demand is given by *13 points*

$\boldsymbol{x_1(p, w) =}$ $\qquad\qquad\qquad\qquad$ $\boldsymbol{, x_2(p, w) =}$

Note: If you approach it correctly, you can answer this question with very little algebra.

Question 3 Demand functions are given by

$$x_1(p_1, p_2, w) = \frac{w}{2p_1}, \quad x_2(p_1, p_2, w) = \frac{w}{2p_1}.$$

Suppose that $p = (1, 1)$ and $p' = (1, 2)$. Prove by directly applying the definition that the weak Axiom is satisfied for any wealth levels w, w'.

Note: You will not get credit if you prove this result by using the substitution matrix, or by showing that there exists a utility function that describes the preferences.

12 points

Proof: Let $x = x(p, w)$ and $x' = x(p', w')$. Then

x = (,   ), and x' = (,   )

Complete the argument in the box below

Question 4 A person, whose demand satisfies Walras' law, consumes only two goods. You have the following information about demand. *13 points*

- At prices $p = (4, 2)$ demand is $x = (5, 8)$
- At prices $p' = (1, 1)$ demand is $x' = (4, x'_2)$.

Then the weak axiom is satisfied if and only if x_2 satisfies the following restrictions:

Question 5 Suppose a utility function is given by $u(x_1, x_2, x_3) = x_1 \min\{x_2, x_3\}$.

Then Hicksean demand for good 2 is given by

$h_2(p_1, p_2, p_3, u) =$

As a consequence, goods 2 and 3 are **substitutes** **complements** because

$\frac{\partial h_2(p_1,p_2,p_3,u)}{\partial p_3}$ $>$ $<$ $=$ 0.

Circle the correct answers. Then *13 points*

Question 6 Suppose a utility function is given by $u(x_1, x_2) = x_1^2 - 2x_2$. Then *12 points*

$\boldsymbol{e(p_1, p_2, u) =}$

$\boldsymbol{v(p_1, p_2, w) =}$

Question 7 Below is a a substitution matrix for a consumer when prices are $p_1 = 2$, $p_2 = 1$, $p_3 = 1$. Fill in the missing entries assuming that *demand is derived from rational preferences*. *12 points*

$$\begin{pmatrix} -6 & \square & \square \\ \square & -10 & \square \\ \square & 4 & \square \end{pmatrix}$$

Question 8 Suppose that utility u is quasi concave (but not necessarily continuous, e.g., for $x \in h(p, u)$ it may be the case that $u(x) > u$). Prove that $h(p, u)$ is a convex set if $h(p, u) \neq \emptyset$. *13 points*

Complete the argument in the box below

Proof: Suppose that $x, x' \in h(p, u)$. Let $\alpha \in [0, 1]$. ...

Scratch Paper: Not Graded

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