Advanced Microeconomics (QEM) - Problem set 2
Due date: Monday, October 19th (end of day) by email or Msteams

Problem 1 (5p) *Let $p \gg 0$ and demand be given by $d(p,w) \in \mathbf{R}^L_{++}$. Assume d is differentiable and satisfy budget balance (Walras's law).*

- *A commodity l is called inferior if its demand is strictly decreasing in wealth. Show that L commodities cannot be all inferior.*
- *A commodity l is called luxury if $D_w d_l(p,w) > \frac{d_l(p,w)}{w}$. Show that L commodities cannot be all luxury.*
- *Show, that if $d(p,w)$ is homogenous of degree 1 in w then $D_w d_l(p,w) = \frac{d_l(p,w)}{w}$ for all l.*
- *Recall d is homogenous of degree 0 in (p,w). Additionally assume $d(p,w)$ is homogenous of degree 1 in w and that d_j does not depend on p_k with $k \neq j$. Show that $d_j(p,k) = \alpha_j \frac{w}{p_j}$ where α is a constant that does not depend on (p,w). [2p]*

Problem 2 (2p) *Let for all t: $x^t = d(p^t, x^t \cdot p^t)$ from some utility maximization problem with U LNS and strictly quasi-concave. Prove that $\{x^t, p^t\}_{t=1}^T$ satisfy WARP.*

Problem 3 (5p) *For $L = 2$ consider demand defined for $p_2 > p_1 > 0$ and $w > 0$ as: $d_1(p,w) = \frac{w}{p_2}$ and $d_2(p,w) = \frac{w(p_2 - p_1)}{p_2^2}$*

- *Show that this demand is homogeneous of degree zero.*
- *Show that this demand satisfies Walras's Law.*
- *State the Weak Axiom of Revealed Preferences (WARP) in the framework of the demand.*
- *Without loss of generality, normalize to 1 the price of commodity 2, and prove that this demand does not satisfy WARP. [2p]*