

- 1) MWG Exercises 3.I.3, 3.I.4, 3.I.5
- 2) Take a consumer with preferences over  $X = \mathbb{R}_+^L$  given by a continuously differentiable, strictly increasing and concave utility function  $u : \mathbb{R}_+^L \rightarrow \mathbb{R}$ . Let  $v(p, w)$  be the indirect utility function.
  - (a) Show that  $u(x) \leq v(p, p \cdot x)$  for all  $x$
  - (b) Show that for all  $x \gg 0$ , we have  $u(x) = \min_{p \gg 0} v(p, p \cdot x)$  [Hint: Use part (a) and the KT theorem]
  - (c) Suppose that  $v(p, w) = (p_1^\rho + p_2^\rho)^{-\frac{1}{\rho}} w$  with  $\rho > 0$ . Find a utility function  $u$  that has  $v$  as the indirect utility function. Check that  $u$  is concave, strictly increasing and differentiable. [Hint use part (b)]
- 3) Consider a population of  $K$  consumers with Marshallian demand  $x^k(p, w^k)$ . Show that if preferences are homothetic, but not identical, and each consumer has a fixed share of total aggregate income (as prices and total income are varied), then there exists a single preference ordering that generates the aggregate demand. Is aggregate demand homothetic?