

EconS 501 - Microeconomic Theory I  
Homework #2 - Due date: September 14th, in class.

1. **Exercise from FMG.** Chapter 2, exercise 26.
2. **Short proofs.** Consider an individual with  $X = \mathbb{R}_+^2$  and budget line  $p_1x_1 + p_2x_2 = w$ , where  $p_1$ ,  $p_2$ , and  $w$  are all strictly positive.
  - (a) If the preference relation is continuous then the consumer's problem has a solution.
  - (b) If the preference relation is strictly convex then the consumer's problem has at most one solution.
  - (c) If the preference relation is monotone then every solution of the consumer's problem must be on the budget line.
  - (d) The demand function of a rational consumer whose marginal rate of substitution,  $MRS(x_1, x_2)$ , is increasing in  $x_2$  for every value of  $x_1$  has the property that good 1 is normal.
3. **UMP in several utility functions.** Consider a consumer with budget line  $p_1x_1 + p_2x_2 = w$ , where  $p_1$ ,  $p_2$ , and  $w$  are all strictly positive. Find her Walrasian demand in the following utility functions, and explain how the consumer distributes her wealth,  $w$ , across both goods.
  - (a) Quasi-linear utility function:  $u(x_1, x_2) = x_1 + \sqrt{x_2}$ .
  - (b) "Max" utility function:  $u(x_1, x_2) = \max\{x_1, x_2\}$ .
  - (c) Utility function with both goods entering quadratically:  $u(x_1, x_2) = x_1^2 + x_2^2$ .
  - (d) Utility function with both goods entering as a square root:  $u(x_1, x_2) = \sqrt{x_1} + \sqrt{x_2}$ .
  - (e) Utility function with intervals:  $u(x_1, x_2) = x_1x_2$  if  $x_1 \leq 10$  units, but  $u(x_1, x_2) = 10x_2$  otherwise.