

## Demand Theory Exercises

1. A household's preferences are described by the utility function  $u(x, y) = \alpha \log x + \beta \log y$ .
  - (a) Derive the marginal rate of substitution function.
  - (b) Derive the demand function for each of the two goods.
  - (c) Compare your answers to Example 3 in the lecture notes.
  - (d) The domain on which  $u$  is defined cannot be  $\mathbb{R}_+^2$ , but it could be  $\mathbb{R}_{++}^2$ . However, in  $\mathbb{R}_{++}^2$  the utility level will be negative for some bundles  $(x, y)$ . Comment on these two issues.
  
2. A household's preferences are described by the utility function  $u(x, y) = y + 2 \log(1 + x)$ .
  - (a) Derive the marginal rate of substitution function.
  - (b) Draw one of the household's indifference curves.
  - (c) Derive the household's demand function for each of the two goods.
  
3. A household's preferences are described by the utility function  $u(x, y) = y + 30x - x^2$ .
  - (a) Derive the marginal rate of substitution function.
  - (b) Draw one of the household's indifference curves.
  - (c) Derive the household's demand function for each of the two goods.
  - (d) For some bundles  $(x, y)$  the MRS is negative (and for some it's zero), and the indifference curves look somewhat unusual. Comment. Could there ever be any goods for which a consumer would have such preferences?
  
4. A household's preferences are described by the utility function  $u(x, y) = a\sqrt{x} + \sqrt{y}$ .
  - (a) Derive the marginal rate of substitution function.
  - (b) Draw one of the household's indifference curves.
  - (c) Derive the household's demand function for each of the two goods.