CHAPTER 1: CONSUMER THEORY

Exercise 1

Show that if \geq is complete and transitive, then:

- 1. if $\mathbf{x} \succ \mathbf{y} \gtrsim \mathbf{z}$, then $\mathbf{x} \succ \mathbf{z}$;
- 2. \succ is both irreflexive ($\mathbf{x} \succ \mathbf{x}$ never holds) and transitive (if $\mathbf{x} \succ \mathbf{y}$ and $\mathbf{y} \succ \mathbf{z}$, then $\mathbf{x} \succ \mathbf{z}$);
- 3. \sim is reflexive ($\mathbf{x} \sim \mathbf{x}$ for all \mathbf{x}), transitive (if $\mathbf{x} \sim \mathbf{y}$ and $\mathbf{y} \sim \mathbf{z}$, then $\mathbf{x} \sim \mathbf{z}$), and symmetric (if $\mathbf{x} \sim \mathbf{y}$, then $\mathbf{y} \sim \mathbf{x}$).

Exercise 2

Prove that strict monotonicity implies local nonsatiation, but not vice versa.

Exercise 3

Assume that there are only two goods in one economy. Draw indifference curves that (a) satisfy and (b) violate each of the following properties:

- 1. transitivity;
- 2. strict convexity;
- 3. convexity;
- 4. strict monotonicity.

Exercise 4

Show that if there exists a utility function that represents \gtrsim , then \gtrsim must be complete and transitive.

Exercise 5

Let $u(x_1,x_2) = kx_1^a x_2^{1-a}$, for 0 < a < 1. Solve the utility maximization problem and find the Marshallian demand functions.

Exercise 6

Let $u(x_1,x_2) = ax_1 + bx_2$, for a, b > 0. Solve the utility maximization problem and find the Marshallian demand functions.

Exercise 7

Let $u(x_1,x_2) = min\{ax_1, bx_2\}$, for a, b > 0. Solve the utility maximization problem and find the Marshallian demand functions.

Exercise 8

Let $u(x_1,x_2) = kx_1^a x_2^{1-a}$, for 0 < a < 1.

- a) Solve the expenditure minimization problem and find the Hicksian demand functions.
- b) Show that the indirect utility function is the inverse of the expenditure function.

Exercise 9

Let $u(x_1,x_2) = ax_1 + bx_2$, for a, b > 0. Solve the expenditure minimization problem and find the Hicksian demand functions.

Exercise 10

Let $u(x_1,x_2) = min\{ax_1, bx_2\}$, for a, b > 0. Solve the expenditure minimization problem and find the Hicksian demand functions.