

Homework 2

Econ 50 - Stanford University - Winter Quarter 2015/16

Due at the beginning of section on Friday, January 22

Exercise 1: *Based on Varian, Microeconomics, 8e, Problem 4.1*

A college football coach says that given any two linemen, A and B , he always prefers the one who is bigger and faster.

- (a) Is this preference relation transitive? Why or why not?
- (b) Is this preference relation complete? Why or why not?
- (c) Is this preference relation monotonic? Why or why not?

Exercise 2: Utility Functions (Lecture 5)

For each of the following utility functions, sketch the indifference curve $u(x, y) = 128$, and write the expressions for the partial derivatives $\frac{\partial u(x, y)}{\partial x}$ and $\frac{\partial u(x, y)}{\partial y}$ and the marginal rate of substitution.

- (a) $u(x, y) = x^2 y^3$
- (b) $u(x, y) = 2x + 4y$
- (c) $u(x, y) = \min\{x, 2y\}$
- (d) $u(x, y) = \sqrt{x} + \sqrt{y}$
- (e) $u(x, y) = x + \ln y$
- (f) $u(x, y) = x^2 + y^2$
- (g) $u(x, y) = x - y$

Exercise 3: Preferences and Utility (Lectures 4 and 5)

In Lecture 4, we said that a preference relation was **convex** if it satisfied the following condition: if A and B are on the same indifference curve, and C is a convex combination of A and B (i.e., lies along a line connecting A and B), then C is preferred to both A and B .

For each of the utility functions from Exercise 2, determine whether the preferences represented by that utility function is convex or not. In particular, for each function, choose points A , B , and C that fit the above definition, draw the relevant diagram showing those points, and show whether the utility at point C is higher than, equal to, or less than the utility at points A and B .

Exercise 4: Utility Functions (Lecture 5)

Which sets of the following utility functions represent the same preferences? How do you know?

- (a) $u(x, y) = 3x + 4y$
- (b) $u(x, y) = x^3 + y^4$
- (c) $u(x, y) = 3 \ln x + 4 \ln y$
- (d) $u(x, y) = x^3 y^4$
- (e) $u(x, y) = x^{\frac{1}{3}} y^{\frac{1}{4}}$
- (f) $u(x, y) = x^{\frac{3}{4}} y$
- (g) $u(x, y) = \frac{3}{4}x + y$
- (h) $u(x, y) = \frac{1}{3} \ln x + \frac{1}{4} \ln y$

Exercise 5: Wow. I feel completely satisfied! (Lectures 4 and 5)

Suppose you only consume two goods: chocolate kisses (x) and peanuts (y). Your marginal utility of chocolate kisses is positive for the first **twenty** kisses you consume each day; beyond the twentieth kiss, though, any additional kisses will make you less and less happy. Similarly, you enjoy positive marginal utility for the first **ten ounces** of peanuts you consume each day, but negative marginal utility for any peanuts beyond that.

- (a) Write down a utility function $U(x, y)$ that is consistent with these preferences; also sketch an indifference curve diagram, indicating with arrows the direction of “higher utility.”
- (b) Are your preferences convex? Explain intuitively, making reference to the indifference curves you drew in part (a).