

ECO 601  
Problem Set #2  
Fall 2003

DUE: Friday, September 12

1. Marsha consumes only two goods, xylophones and yakburgers. Her utility is given by the function  $U(X, Y) = X^5Y^5$ .
  - a) Graph the indifference curve associated with a level of utility equal to 20.
  - b) Derive an expression for Marsha's marginal rate of substitution between xylophones and yakburgers, and show how it can be expressed in terms of marginal utilities.
  - c) What is Marsha's  $MRS_{x,y}$  if she is consuming ten xylophones on the  $U=20$  indifference curve?
  
2. Consider the utility function  $U(X, Y) = X^5Y$ .
  - a) Is more preferred to less for both X and Y? Hint: derive expressions for  $MU_x$  and  $MU_y$ .
  - b) Do the consumer's preferences exhibit diminishing marginal utility for both X and Y?
  
3. Draw representative indifference curves,  $U_1$  and  $U_2$ , with  $U_1 > U_2$ , for each of the following two sets of goods:
  - a) Hamburgers and hot dogs (the consumer likes both and has diminishing MRS).
  - b) Pepsi-Cola and Coca-Cola (the consumer is not able to distinguish between the two and is unaffected by brand image advertising).
  - c) Peanut butter and jelly (the consumer likes exactly 2 ounces of peanut butter with every ounce of jelly on her peanut butter and jelly sandwiches).
  - d) Nuts (which the consumer neither likes nor dislikes) and ice cream (which the consumer likes).
  - e) Apples (which the consumer likes) and radishes (which the consumer dislikes).
  
4. Graph a typical indifference curve for the following utility functions and determine whether they have convex indifference curves (i.e., whether they exhibit diminishing MRS.) Then confirm that the following condition holds for utility functions that have convex indifference curves:  $f_2^2 f_{11} - 2f_1 f_2 f_{12} + f_1^2 f_{22} < 0$  (see footnote 8 in Chapter 3).
  - a)  $U = 3X^{1/3}Y^{2/3}$ .
  - b)  $U = -X^{-1} - Y^{-1}$ .
  - c)  $U = X + \ln Y$ .
  - d)  $U = 2X^2 + 3Y^2$ .
  
5. True, False, or Uncertain, and Explain: RE Problem 1 above: Marsha's not-so-hip (you could almost call her square) twin sister Melinda has a utility function given by  $U = 2X^{.75}Y^{.75}$ . Even if Marsha and Melinda are identical in every other way, their parents will still be able to tell them apart by the consumption choices that they make.