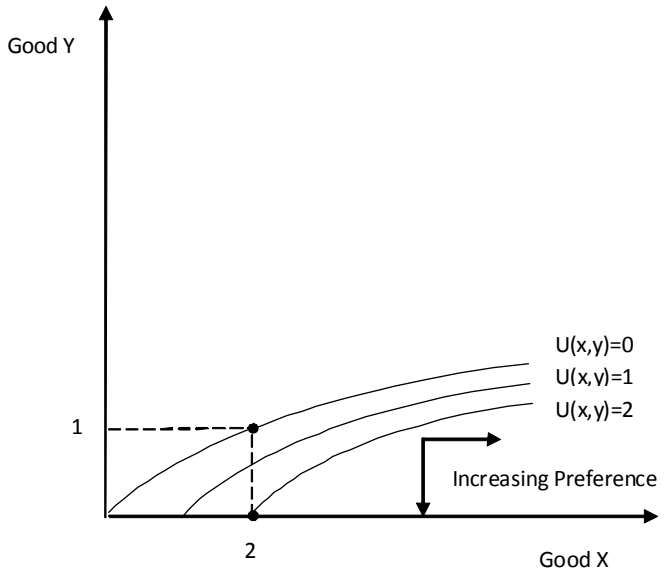
Econ 30010
Intermediate Microeconomic Theory

Answers to Chapter 3 Problems

7a. To graph indifference curves, set $U(x,y)$ equal to an initial value (0 can be a good choice when some products are goods and some products are bads). Then, solve for y in terms of x and graph the resulting line. To determine the direction of increasing utility, think about what changes in x and in y will unambiguously increase utility. For this problem, since the marginal utility with respect to x is always positive, product x is a good which means more of product x is always better for the consumer. Since the marginal utility with respect to y is always negative, product y is a bad which means less of y is always better. Thus, utility will be increasing in the direction of more of product x and less of product y.



15. $U(x,y) = 3x + y$

a. Since the marginal utilities are strictly positive, the "more is better" condition is satisfied. For this utility function, when the consumer receives an additional unit of x her utility increases by 3 and when she receives an additional unit of y her utility increases by 1.

b. The marginal utility of x is a constant.

c. $MRS_{xy} = MU_x(x,y)/MU_y(x,y) = 3/1 = 3$

d. The marginal rate of substitution of x for y is a constant.

16. $U(x,y) = \sqrt{xy}$

a. The marginal utilities are positive for all positive values of x and y so the "more is better condition" is satisfied.

b. The marginal utility of x is diminishing as x increases. This means each additional unit of x increases utility by less than the previous unit.

c. $MRS_{xy} = \dfrac{MU_x(x,y)}{MU_y(x,y)} = \dfrac{\sqrt{y}/(2\sqrt{x})}{\sqrt{x}/(2\sqrt{y})} = y/x$

d. Since both commodities are goods, increasing x while staying on the same indifference curve requires that the consumer also decrease y. Both an increase in x and a decrease in y decreases the MRS_{xy}.

17. $U(x,y) = xy + x$

a. The marginal utilities are positive for all positive values of x and y so the "more is better condition" is satisfied.

b. The marginal utility of x does not change as x increases.

c. $MRS_{xy} = \dfrac{MU_x(x,y)}{MU_y(x,y)} = \dfrac{y+1}{x}$

d. Since both commodities are goods, increasing x while staying on the same indifference curve requires that the consumer also decrease y. Both an increase in x and a decrease in y decreases the MRS_{xy}.

Question: For each of the above utility functions, can you find the equation for the 100-unit indifference curve?