EC 311
Midterm Practice
Winter 2024

1. You are going to the movie theatre to watch a movie and have the following utility function over popcorn (P) and soda (S): $U(P, S) = \min\{2P, S\}$. After buying a ticket, you have \$12 left for snacks. Popcorn costs \$6 and soda costs \$3.

   a.) Write the budget constraint and draw it on the graph. Label the axis and the intercepts.

   $$6P + 3S = 12$$

   b.) Solve for the optimal amount of popcorn and soda that maximizes your utility.

   $$2P = S$$

   $$6P + 3(2P) = 12$$

   $$12P = 12$$

   $$P^* = 1$$

   $$6 + 3S^* = 12$$

   $$S^* = 2$$

   c.) What utility level is achieved from the optimal amount of popcorn and soda? Draw the indifference curve on the graph.

   $$U(P, S) = \min\{2 * 1, 2\} = 2$$

   d.) Due to supply chain issues, the price of soda increases to \$5. What are the new optimal amounts of popcorn and soda? What utility level is achieved with this price change?

   $$2P = S$$

   $$6P + 5(2P) = 12$$

   $$16P = 12$$

   $$P^* = 0.75$$

   $$6(0.75) + 5S^* = 12$$

   $$S^* = 1.5$$

   $$U = \min\{2 * 0.75, 1.5\} = 1.5$$

   e.) Explain intuitively why your utility level increased/decreased/stayed the same.

   When the price of soda increases and your budget doesn't change, you can afford less soda. The decrease in consumption results in a decrease in utility.

   f.) When the price of soda is \$5, how much money would you need to spend to attain the same utility?

   $$6 * 1 + 5 * 2 = 16$$

2. **Short Answer:** In one or two sentences, answer the following questions.

   a.) What does it mean to be a normal good vs and inferior good?

   A good is normal if you consume more of that good when you have more income. A good is inferior if you consume less of that good when you have more income.

   b.) What does it mean to be an ordinary good vs Giffen good?

   A good is ordinary if you consume more of that good when the price decreases. A good is a Giffen good if you consume less of that good when the price decreases.

3. Find the optimal consumption bundles for the following utility functions. Assume you have the same budget for all scenarios: $2X + 6Y = 36$.

$$\frac{P_X}{P_Y} = \frac{2}{6} = \frac{1}{3}$$

   a.) $U(X, Y) = 4X^{.5} + 2Y$

$$MRS = \frac{2X^{-.5}}{2} = \frac{1}{X^{.5}}$$

$$\frac{1}{X^{.5}} = \frac{1}{3}$$

$$3 = X^{.5}$$

$$X^* = 9$$

$$2 * 9 + 6Y^* = 36$$

$$Y^* = 3$$

   b.) $U(X, Y) = 4X^{.5}Y$

$$MRS = \frac{2X^{-.5}Y}{4X^{.5}} = \frac{Y}{2X}$$

$$\frac{Y}{2X} = \frac{1}{3}$$

$$3Y = 2X$$

$$X^* = \frac{3}{2}Y$$

$$2 * \frac{3Y}{2} + 6Y = 36$$

$$Y^* = 4$$

$$X^* = \frac{3}{2} * 4 = 6$$

c.) $U(X,Y)$=2X+4Y

$$MRS = \frac{2}{4} = \frac{1}{2}$$

$$\frac{1}{2} > \frac{1}{3}$$

$$Y^* = 0$$

$$2 * X^* + 0 = 36$$

$$X^* = 18$$