EC 311
Theory and Elasticity
Winter 2024

1. Suppose demand for watermelon is represented by:

$$Q_D = 10 - .5P$$

$$\frac{\partial Q}{\partial P} = -.5$$

a.) If the price of watermelon is \$16, what is the price elasticity of demand?

$$\frac{\partial Q}{\partial P} * \frac{P}{Q} = -.5 * \frac{16}{2} = -4$$

b.) At \$16, is watermelon elastic, inelastic, or unit elastic? Elastic

c.) If the price of watermelon is \$10, what is the price elasticity of demand?

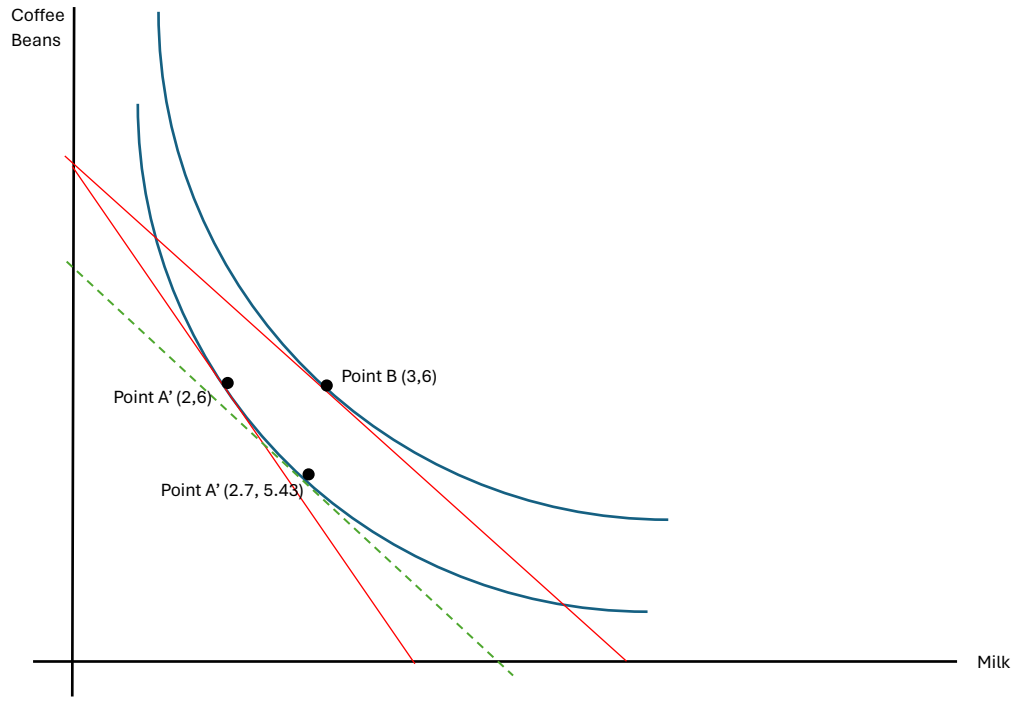
$$-.5 * \frac{10}{5} = -1$$

d.) At \$10, is watermelon elastic, inelastic, or unit elastic? Unit Elastic

e.) If the price of watermelon is \$4, what is the price elasticity of demand?

$$-.5 * \frac{4}{8} = -.25$$

f.) At \$4, is watermelon elastic, inelastic, or unit elastic? Inelastic



2. Let the x-axis represent milk and the y-axis represent coffee beans. We begin at point A until a new technology comes out that speeds up the milking process. This causes the price of milk to decrease, and our optimal bundle moves to point B. Using the image above, answer the following:

   a.) What is the substitution effect for milk? $2.7 - 2 = .7$

   b.) What is the income effect for milk? $3 - 2.7 = .3$

   c.) Is milk a normal good or inferior good? Normal

   d.) What is the total effect for milk? 1

3. It's the weekend before finals, and you have modeled your utility for resting and studying by:

$$U(R,S) = 2\,\mathrm{R} * \ln(S)$$

   a.) What is your marginal utility of studying when you have rested for an hour already?

$$MU_S = \frac{2R}{S} = \frac{2}{S}$$

   b.) How does your marginal utility of studying depend on the amount of studying you have already done? Marginal utility of studying is decreasing in the amount of studying done.

   c.) How does your marginal utility of studying depend on the amount of rest you've had? Marginal utility of studying is increasing in the amount of rest you've had.

   d.) How does your marginal utility of **resting** depend on the amount of studying you've done? Marginal utility of resting is increasing in the amount of studying you've done.

$$MU_R = 2\ln(S)$$

   e.) Suppose you have studied for 10 hours and have rested for 24 hours. Should you spend the next hour studying or resting? **Hint: $\boldsymbol{ln(10) \approx 2.3}$**

$$MU_S = \frac{2 * 24}{10} = 4.8$$

$$MU_R = 2\ln(10) = 2 * 2.3 = 4.6$$

$$MU_S = 4.8 > 4.6 = MU_R \Longrightarrow Spend\ the\ next\ hour\ studying.$$

4. For the following utility function, use marginal utilities to answer the questions.

$$U(x,y) = x^{-2}y$$

   a.) Is x a good or a bad?

$$MU_x = -2x^{-3}y < 0 \Longrightarrow Bad$$

   b.) Is y a good or a bad?

$$MU_y = x^{-2} > 0 \Longrightarrow Good$$