EconS 301- Intermediate Microeconomic Theory
Homework #3 - Due date: Thursday March 5th, 2026.

1. Every spring, John goes to a local co-op to buy seeds to plant in his field. He has been keeping track of prices of seeds and the number of tons of seeds that he buys each year and estimates his demand curve to be $p(q) = 300 - 10q$. Last year, John paid \$150 per ton of seeds. This year, he noticed that the price went down to \$100. Unfortunately, John didn't take any economics courses in college, so he doesn't know how to quantify his welfare improvement. Help John find his CS from this price decrease.

2. Chris has a demand for books (b) and other goods (y) that follows the Cobb-Douglas utility function $u(b, y) = y\sqrt{b}$, and an income of $I = \$50$. Find Chris's CV if the price of books decreases from $p_b = \$2$ to $p_b' = \$1$.

3. You are looking at two firms as an investment opportunity.

   - For the first firm, you know that with probability 0.7, your investment will mature to a profit of \$45 million, and with probability 0.3, your investment will mature to a loss of \$30 million.
   - For the second firm, you know that with probability 0.8, your investment will mature to a profit of \$30 million, and with probability 0.2, your investment will mature to a loss of \$7.5 million.

   (a) Calculate the EV of each investment.

   (b) Calculate the variance of each investment.

   (c) If you had the opportunity to invest in only one of these firms, which would you pick and why?

4. Suppose that you took part in a lottery that had a chance to increase, decrease, or have no effect on your level of income. With probability 0.5, your income remains at its original level, \$500. With probability 0.2, your income increases to \$700, and with probability 0.3, your income decreases to \$400. Your utility function is

$$u(I) = I^{0.7},$$

   where I denotes your income level.

   (a) Using only the utility function, show that your risk preferences are risk averse.

   (b) Calculate both your EU and the utility equivalent of the EV of your income.

   (c) Using the results from part (b), show that your risk preferences are risk averse.

   (d) Suppose now that you had the option to either accept this lottery, or walk away with your initial \$500. Should you accept the lottery? Why or why not?

   (e) Calculate your certainty equivalent.

   (f) Calculate and interpret your risk premium. Is it consistent with risk aversion?

5. Consider a situation where you are faced with a risky situation. You currently have \$100,000 available for consumption, and with a 90 percent probability, you would suffer no illness. You have a 9 percent chance, however, of contracting a case of influenza, leading to the loss of \$10,000 in consumption. In addition, there is a 1 percent chance that this is a severe illness, leading to the loss of \$50,000 in consumption. Your utility from consumption is

$$U(C) = C^{0.4},$$

where C is your consumption level.

   (a) What is your attitude toward risk? How do you know this?

   (b) Suppose that you could purchase insurance against influenza. What is your CE?

   (c) What is the maximum premium that you are willing to pay for insurance against influenza?

   (d) What is your risk premium? How does this compare with your risk premium if you were risk neutral?