ECON 251: Problem Set 6

Due Friday October 28 by 11:00 PM

Instructions. Each part of a problem is worth one point. Don't forget to answer the last two questions, as they are each worth one point. Unless otherwise stated, you can always assume that goods are continuously divisible: there is no need to consume an integer number of units of any good. Once you have finished, please submit your completed problem set on gradescope. To do this, you will either need to upload a pdf of your entire problem set or an image (for example, a picture that you take with your phone) of your work for each problem. If you upload a pdf, you will need to tag each problem on the appropriate page of the document. Please show your work and draw a box around your final answer. You are free to work together with your classmates, but the work that you upload must be your own.

1. Give an example of two choices that violate the Weak Axiom of Revealed Preference.

2. What is the expected value of the lottery $L = \{0.25, 0.25, 0.5; 12, 128, 400\}$?

3. Rocky is an expected utility maximizer whose Bernoulli utility function over money payoffs is $u(x) = \sqrt{x}$. What is the expected utility of receiving 4 dollars with probability one?

4. Marshall is an expected utility maximizer whose Bernoulli utility function over money payoffs is $u(x) = \frac{\sqrt{x}}{2}$. What is Marshall's expected utility from the lottery $L = \{0.25, 0.25, 0.2, 0.3; 16, 64, 225, 400\}$?

5. Zuma is an expected utility maximizer whose Bernoulli utility function over money payoffs is $u(x) = \ln(x)$. Zuma is indifferent between the lottery $L = \{0.25, 0.5, 0.25; 16, 225, 256\}$ and receiving z dollars with probability one. What is z?

6. Skye is an expected utility maximizer whose Bernoulli utility function over money payoffs is $u(x) = \ln(x)$. Skye faces the following gamble: they must divide a budget of $m > 0$ between Accounts 1, 2, and 3. For $i = 1, 2, 3$, let x_i denote amount of money allocated to Account i.

   After Skye makes their decision, Mayor Goodway will roll a six-sided die. The roll of the die determines which of the three accounts Skye will receive. If the die lands on 1 or 2, Skye receives the money in Account 1. If the die lands on 3 or 4, Skye receives the money allocated to Account 2. If the die lands on 5 or 6, Skye receives the money in Account 3. All six possible outcomes of the roll of the die are equally likely.

   The price of allocating money to Account i is p_i. Thus, if Skye allocates m to Account i and that ends up being the account that they receive, Skye's payoff from the lottery is m/p_i.

   (a) What is Skye's expected utility from the allocation decision (x_1, x_2, x_3)?
   (b) What are the first-order conditions characterizing Skye's expected utility maximizing allocation choice?
   (c) How much does Skye allocate to Account 1?

7. Chase is an expected utility maximizer whose Bernoulli utility function over money payoffs is:

$$u(x) = \frac{x^{1-r}}{1-r}$$

   where $r > 0$ is a constant. Chase has initial wealth $m > 0$. Chase needs to choose an amount $x \leq m$ for the following gamble: with probability π, Chase will receive their initial wealth plus ax; and with probability $1 - \pi$, Chase will receive their initial wealth minus x.

(a) What is Chase's expected utility from the gamble?

(b) What value of x does Chase choose?

8. Which of your classmates did you work with on this problem set?

9. Did you attend Jamie's TA office hours, or get help from her over email or outside of her regular office hours?