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Philosophy 666: Rational Choice Theory
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Test on Utility Theory

Instructions:

1. Answer all of the following questions on the answer sheets provided. You can write on this list of questions, but credit will be awarded only for answers written on answer sheets.

2. Do not access any book, notebook, newspaper, calculator, computer, cell phone, or other possible source of inappropriate aid during the test, do not leave the room before you are finished taking the test, and be sure to finish the test within this 50-minute testing period—no credit will be given for any work done after you access any possible source of inappropriate aid, after you leave the room for any reason, or after the end of the testing period.

3. When you are finished, be sure your name is written on each of your answer sheets, and turn them in. Also, turn in this list of questions. If you write your name on it, it will be returned with your graded answer sheets.

Questions:

1. What does the transitivity condition require? (You do not need to state all four clauses; you can just state the first one.) What is the money-pump argument? How is this argument used to criticize or defend the transitivity condition?

2. Suppose Louis has these preferences: a P b, b P c, c P d. And suppose Louis's preference for a over b is four times as strong as his preference for b over c, which in turn is one third as strong as his preference for c over d. What is an interval utility function that accurately represents Louis's preferences?

3. Suppose option A_1 has a utility of 1 in state S_1, a utility of 2 in state S_2, and a utility of 3 in state S_3. Suppose option A_2 (in the same choice situation) has a utility of 4 in state S_1, 3 in state S_2, and 2 in state S_3. What, if anything, would the dominance principle recommend in this situation? What, if anything, would the maximin principle recommend in this situation? (Explain your reasoning for both principles.)

4. Suppose Greta is applying the maximax rule in a particular situation, for which she has written out a choice matrix. Do the numbers in the matrix need to be utilities from an interval utility function, or is it sufficient if they are from an ordinal utility function? Explain your answer.

For questions 5 and 6, let lottery L provide a 1/5 chance of winning $1,000 and a 4/5 chance of winning $0.

5. Suppose Betty prefers more money to less, but also prefers L to $200. What are utility assignments for the three dollar amounts ($0, $200, and $1,000) that make the principle of maximizing expected utility agree with Betty's preferences?

6. Suppose Wayne prefers $300 to lottery L. Is he risk averse, risk neutral, or risk seeking, or do we not have enough information to say for sure?

For questions 7 and 8, assume that $u(\$50) = u(\$30) + x$, $u(\$60) = u(\$50) + y$, and $u(\$90) = u(\$60) + z$, with x, y, and z being positive numbers. Also, the following instructions apply to both questions:

    a.   Any equation or inequality in your answer should have just z on the left, and just one mention of x and/or one mention of y on the right. Note that x and y may, of course, have coefficients; for example, it would be o.k. for the right side of your answer to be something like $-(1/5)x + 33y$.

    b.   Show your work.

7.   Suppose Penelope prefers a lottery giving her a 3/4 chance at $60 and a 1/4 chance at $50 to a lottery giving her a 3/4 chance at $30 and a 1/4 chance at $90. What constraint(s) on x, y, and z (in addition to $x > 0$, $y > 0$, and $z > 0$) imply utility assignments for the four dollar amounts that make the principle of maximizing expected utility agree with this preference?

8.   Suppose Penelope prefers $60 to a lottery giving her a 2/3 chance at $90 and a 1/3 chance at $50. What constraint(s) on x, y, and z (in addition to $x > 0$, $y > 0$, and $z > 0$) imply utility assignments for the four dollar amounts that make the principle of maximizing expected utility agree with this preference?

9.   Do your answers to questions 7 and 8 imply that Penelope's preferences violate one or more of the conditions referred to in the representation theorem? Why or why not?

10. What is one of the conditions referred to in the representation theorem? (You do not have to remember the name of any of the conditions but you to have to accurately state the content of one of the conditions.)

Instructions, revisited:

As stated in item 3 of the instructions, turn in this list of questions along with your answer sheets.