Philosophy 4300: Decision Theory
Spring 2019

Homework 4 – due in class on Friday, April 5th.

You should feel free to work with others on this homework and to talk to me about it. However, any work you produce must be your own.

1) Imagine we have a game with two acts – A1 and A2 – and two states S1 and S2. Prove that if A1 dominates A2, then EU(A1) > EU(A2). [Note that it is true in general no matter how many states there are, but using proper notation in the general case is harder so we can just skip that].

2) Do Resnik's problem 1 on page 85.

3) Suppose that purchasing a certain type of insurance works like this: You pay $x to the insurance company. Then if A happens, you receive $y. If ~A, then you receive nothing. First, show that it is impossible for both the person buying and person selling the insurance to have a positive expected monetary value from the transaction. Second, explain how it _is_ possible for both the buyer and the seller to have a positive expected utility value from the transaction (this explanation should involve both numbers and calculations and also words explaining what is going on).

4) Do Resnik's problem 4 on page 88.

5) Imagine a game with four states. Act1 yields outcomes o1, o2, o3, and o4 in those four states. The probability of the states are P(S1)=P(S2)=P(S3)=P(S4)=1/4. Construct a lottery of the form L(a,x,y) which is equivalent to performing Act 1.

[[Note that doing problem 5 will help you with 6, but doing 6 would also help you with 5 so if you are stuck on one, think about the other one]].

6) Assume that u(x) = x, u(y) = y, and so on for z and w. What is the expected utility of the following lottery: L(a, L(b, x, y), L(c, L(d, x, z), L(e, x, w)))?

7) Do Resnik's problem 3 on page 98. The answers should be in the form of u'(x) = au(x) + b.

8) Do Resnik's problem 1 on page 109.

9) Do Resnik's problem 1 on page 115.

10) Do Resnik's problem 2 on page 115.