INTERNATIONAL UNIVERSITY OF JAPAN
Public Management and Policy Analysis Program
Graduate School of International Relations

DCC5350 (2 Credits)
Public Policy Modeling
Spring 2016

Homework 2: Decision Analysis (100 points)

Instruction: Write down your student ID and name at the top of your answer. PLEASE handwrite. You may use Excel for calculation but handwrite the calculation on your answer sheet (You don't need to submit your Excel worksheet). Organize your answer in the ascending order (1, 2, …) and use single column. Show your calculation clearly; otherwise, you may not get the full credits. You may not communicate (including written, verbal, gestural, any other communication) with others except for the instructor and TAs to do this homework. Submit your answer to TA at the start of the class on Wednesday, April 20th.

Question: Read Question 9.26 on page 375 very carefully. Suppose that the losing season includes tied season (average winning): 30 percent of chance of losing season and 10 percent of chance of being tied. A campaign during a tied season will bring $1 million. Other information remains unchanged.

Caution: "Make a decision" means that you must explicitly mention your decision. Calculation itself is not a decision. You should say, for instance, "So, I will go picnic" rather then "I will choose the first alternative" or "I will choose the best one."

Question 1. Payoff table (5 points).

   1.1 (5 points) Solve the question *a*. Construct a payoff table.

Question 2. Decision-making under uncertainty (Assume no probability) (20 points).

   2.1 (5 points) Make a decision with Savage criterion. Report the regret table.
   2.2 (5 points) Choose one criterion (other than Savage) that you prefer most and explain why (your way of viewing the world).
   2.3 (5 points) Make a decision with your criterion in Q2.2. If you choose Hurwicz, specify a value of alpha.
   2.4 (5 points) Make a decision with one criterion that you don't like most. Indicate your choice. If you choose Hurwicz, specify a value of alpha.

Question 3. Decision-making under risk (10 points).

   3.1 (5 points) Make a decision using EMV.
   3.2 (5 points) Make a decision using EOL.

Question 4. Expected value of perfect information (10 points). Suppose you have perfect information about the performance of the football team.

4.1 (5 points) Draw the decision tree under the perfect information. Be careful when determining squares and circles.

4.2 (5 points) Solve question *c*. Report he expected monetary value **with** (under) this perfect information as well. Fill out squares and circles of Q4.1 with right figures.

Question 5. Expected value of imperfect information (55 points). Read question *d*. William predicts football team's performance in a season by thumbing up or down. Additional information (conditional probabilities) says that his predictions have been correct 75 percent of the time: P(Up|Winning)=.75 and P(Down|Losing)=.75. There is 50-50 chance for being tied: P(Up|Tied)=.50. William asks $100,000 for his hunch (information).

5.1 (5 points) Identify two decision variables of the Athletic Department in this circumstance (e.g., eating apple or orange is one variable).

5.2 (5 points) Identify at least two environment variables in this decision situation.

5.3 (5 points) Calculate six *joint probabilities*. Begin with P(Up & Winning).

5.4 (3 points) Calculate (*unconditional) marginal probabilities*.

5.5 (7 points) Calculate six *posterior probabilities*. Begin with P(Winning|Up).

5.6 (5 point) Calculate expected values of four cases. Begin with the expected vale of undertaking campaign given William's thumb-up.

5.7 (5 points) Calculate the expected value **with** this imperfect information.

5.8 (7 points) Solve question *h*.

5.9 (5 points) Draw a decision tree under this imperfect information. Don't forget to add all expected values and/or payoffs in circles and squares.

5.10   (8 points) Draw a decision tree with buying William's hunch incorporated. It should look similar to Figure 9.16 on page 347. What is the final decision of the department?

End of homework assignment 2.