Stat/Econ 473 Game Theory
Problem Set 1

Due: Thursday January 21

From the Text: Do problems 2.5, 2.6, 2.8 and 2.9 [For problems 2.8 and 2.9 consider a simplfied form of the game where Player 1 can only offer $0, $0.50 or $1.]

1) A city has an annual budget of $20,000,000. City code restricts spending on parks to no more that 5% of the budge. The mayor wants to choose the parks budget to maximize the benefity to the community. If the budget is $$c$ then the benefit is

$$v(c) = \sqrt{400c} - \frac{c}{80}.$$

a) What is the optimal choice of budget?
b) Suppose public opinion shifts and the new benefit function is

$$v(c) = \sqrt{1600c} - \frac{c}{80}.$$

What is the new optimal budget choice?

2) At the dog races you have to decide whether or not to bet. If you decide to bet you must decide wheter to bet $1 on Snoopy or Lassie. A winning bet on Snoopy pays $2 and a winning bet on Lassie pays $11. You believe the probability of Snoopy winning is 0.7 and the probability of Lassie winning is 0.1–there is a probability of 0.2 that some other dog wins.
a) Draw the decision tree for this problem.
b) What is your optimal strategy?

3) Alice is practing for a race and falls injuring her leg. There is a 0.2 probability that the leg is broken. Alice has to decide whether to enter an upcoming race. If she enters the race there is a 0.1 probability that she will win (this does not depend on whether the leg is broken. But if the leg is broken she runs the risk of serious injury. Her payoffs are as follows:
+100 if she wins and the leg is not broken
+50 if she wins and the leg is broken
0 if she loses and the leg is not broken
-50 if she loses and the leg is broken
-10 if she doesn't run and the leg is broken
0 if she doesn't run and the leg is not broken

a) Draw the decision tree for this problem and determine what Alice should do.
b) Suppose Alice could have tests and find out whether her leg is broken before making the decision. Draw the revised decision tree and determine Alice's optimal strategy.