

Finance 510 Problem Set #5

- 1) Consider the familiar “Rock, Paper, Scissors” game. Two players indicate either “Rock”, “Paper”, or “Scissors” simultaneously. The winner is determined by
- Rock crushes scissors
 - Paper covers rock
 - Scissors cut paper

Indicate a -1 if you lose and +1 if you win. Write down the strategic (matrix) form of the game. What is the Nash equilibrium of the game?

In an episode of Seinfeld, Kramer played a version of this game with his friend Mickey except that the rules were a little different:

- Rock crushes scissors
- Rock Flies Right through paper
- Scissors cut paper

How does this modification alter the Nash equilibrium of the game.

- 2) Consider the following version of the prisoners dilemma game (Player one’s payoffs are in bold):

		Player Two	
		Cooperate	Cheat
Player One	Cooperate	\$10 \$10	\$0 \$12
	Cheat	\$12 \$0	\$5 \$5

- a) What is each player’s dominant strategy? Explain the Nash equilibrium of the game.
 - b) Suppose that this game were played three times in a row. Is it possible for the cooperative equilibrium to occur? Explain.
 - c) Now, suppose that this game was played an infinite number of times. For what values of the interest rate is the present value of cooperating higher than the value of cheating (so that a cooperative equilibrium could occur)
- 3) Consider the following bargaining problem: \$20 dollars needs to be split between Jack and Jill. Jill gets to make an initial offer. Jack then gets to respond by either accepting Jill’s initial offer or offering a counter offer. Finally, Jill can respond

by either accepting Jake's offer or making a final offer. If Jake does not accept Jill's final offer both Jack and Jill get nothing. Jack discounts the future at 10% (i.e. future earnings are with 10% less than current earnings while Jill discounts the future at 20%. Calculate the Nash equilibrium of this bargaining problem.

- 4) Consider a variation on the previous problem:

You and your sister have just inherited \$3M that needs to be split between the two of you.

The rules are the same as above (offer, counteroffer, and final offer) except that each period, \$1M is removed from the total (each round of negotiation costs \$1M in lawyers fees). Further, assume that both you and your sister value future payments just as much as current payments (i.e. no discount factor). Calculate the Nash equilibrium for this game. Assume that you get to make the first offer.

- 5) Consider yet, another variation of the previous problem: Same rules as in (4), However, this time, you learn something about your sister: You discover that your sister has always hated you. All she cares about with regards to splitting the \$3M is that she gets more than you do (i.e. an allocation of \$500,000 for you and \$1M for her is preferred by her to an allocation of \$1.5M apiece!). Calculate the new Nash equilibrium of the game. (Note: Your incentives are the same as in (4), you want to get as much as possible.) Again, assume that you are making the first offer.