Game Theory: Practice for Zero-Sum Games (Spring, 2020)

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1. For each of the zero-sum matrix games below (named U, V, and W respectively), where payoffs are shown from the point of view of the row player (hence Column gets the negative of these numbers):

a. Determine the value of the game using pure strategies if there is such a value.

b. Determine if the game has a "saddle point" and if so indicate which cell is the saddle point and the value of the game.

c. What is the result of using dominant strategy analysis for the games?

d. Determine the value of the game using optimal mixed strategies for the two players if there is no optimal pure strategy solution.

e. Which, if any of these games is fair? Do you see a pattern?

	Column I	Column II
Row 1	50	-10
Row 2	-10	2

	Column I	Column II
Row 1	50	-25
Row 2	-4	2

	Column I	Column II
Row 1	-2	100
Row 2	1	-50

2. Because there is no pure strategy way of optimally playing the game below (payoffs shown from Row's point of view) each of the players separately decides that flipping a fair coin is the optimal way to find a mix of playing the rows by Row and of playing the columns by Column.

	Column I	Column II
Row 1	10	-6
Row 2	-6	4

How does this approach compare with the payoffs the players earn when they use optimal play? What percentage of the time does Row win in this case?

3. Find the value, if possible using dominant strategy analysis, looking for a best-worst way to play, and/or using mixed strategy analysis for the two zero-sum games below with payoffs from Row's point of view. Do games X and Y have a value?

Game X

Row/Column	I	II	III
1	6	9	4
2	7	8	9
3	5	10	2

Game Y

Row/Column	I	II	III
1	-3	17	-15
2	1	4	2
3	-2	-4	14