

### Homework 3: Game Theory (2019)

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1. Given the decision matrix below:

Decision maker ROW/Nature (Column)	I	II	III	IV
1	12	-1	1	0
2	5	1	7	-18
3	3	2	4	3
4	-20	0	0	16

- What action would the decision maker choose if he/she selects the best of the worst outcomes?
- Which action would the decision maker choose if he/she selects on the basis of assuming that nature's states are equally likely?
- Do any of the rows in this matrix above dominate other rows?
- Construct the Savage regret matrix associated with this decision problem. What action would the decision maker choose to minimize the maximum

regret?

2. Given the non-zero sum game below

	Column I	Column II
Row 1	(4, 3)	(-6, 6)
Row 2	(11, -8)	(-9, -7)

- Draw a motion diagram for this game.
- Are there any row or column dominations in this game?
- Determine all of the Nash equilibria for this game, assuming any exist.
- Suppose the (4,3) entry is changed to (x,y) where x and y are positive integers distinct from the other entries in the matrix. What are the smallest values of x and y such that playing Row 1 and Column I as pure strategies yields a Nash equilibrium?
- Using the values you find for x and y from d., is there a mixed strategy Nash equilibrium for the matrix?