Math 5370 **GAME THEORY** Spring 2019
Dr. Duval **Homework**

Monday, February 11

Follow the separate general guidelines for Parts A,B,C. Be sure to include and label *all four* standard parts (a), (b), (c), (d) of Part A in what you hand in.

Simplifying zero-sum games: Saddle points; equalizing payoffs

Subsections 2.4.1, 2.4.2

A: Reading questions. Due by 2pm, Sun., 18 Feb.

1. Construct a zero-sum game with two actions per player that does *not* have a saddle point, and explain why it does not.
2. Can a zero-sum game have two different saddle points? Why or why not?
3. Why does the equalizing payoffs technique for computing the value of a game require each action to be assigned a positive probability? Find an example of a game that you know violates this assumption (you know the optimal strategy for one or both players assigns at least one action a probability of 0), and show what happens when you try to apply the equalizing payoffs technique.

B: Warmup exercises. For you to present in class. Due by the end of class Mon., 18 Feb.

Exercise 2.b

Simplifying zero-sum games: domination; symmetry

Subsections 2.4.3, 2.4.4

A: Reading questions. Due by 2pm, Tue., 19 Feb.

1. Recall how diagrams like those in Figure 2.2 can be used to solve zero-sum games where at least one player has only two options. What do such diagrams look like when one player has one strategy that dominates another strategy? Show an example.
2. Explain why Claim 2.4.3 is "intuitively clear by symmetry", as stated at the beginning of the proof.
3. Fill in the missing details of the final paragraph of the proof of Claim 2.4.3, deriving the optimal strategy for each player.
4. Explain each of the entries in the "more manageable payoff matrix" near the middle of p. 32.

B: Warmup exercises. For you to present in class. Due by end of class Wed., 20 Feb.

Modify the submarine game so that the submarine takes up *three* consecutive squares. Solve this game.