Game Theory Homework #3, 02/10/2021

All the problems are worth 4 points each and will be graded on a 0/1/2/3/4 scale. Due on Wednesday 02/17/2021 before 11:59 pm to be uploaded via Gradescope.

1. Player II is moving an important item in one of three cars, labelled $1, 2$ and 3. Player I will drop a bomb on one of the cars of his choosing. He has no chance of destroying the item if he bombs the wrong car. If he chooses the right car, then his probability of destroying the item depends on that car. The probabilities for cars 1,2 and 3 are equal to $3/4$, $1/4$ and $1/2$. Write the 3×3 payoff matrix for the game, and find some optimal winning strategies for each of the players.

2. Find the value and all safety strategies for the game

$$\begin{pmatrix} 9 & 6 & 7 \\ 3 & 0 & 1 \\ 4 & 16 & 12 \end{pmatrix}$$

3. Show that in Submarine Salvo the submarine has an optimal strategy where all choices containing a corner and a clockwise adjacent site are excluded.

4. Given that $p = (52/143, 50/143, 41/143)$ is optimal for Player I in the game with the following matrix, what is the value?

$$\begin{pmatrix} 0 & 5 & -2 \\ -3 & 0 & 4 \\ 6 & -4 & 0 \end{pmatrix}$$

5. Consider a zero-sum game with the following payoff matrix;

$$\begin{pmatrix} 12 & 7 & 4 & 3 & 2 & 1 & 12 \\ 1 & 2 & 3 & 4 & 6 & 11 & 11 \end{pmatrix}$$

   Find all possible optimal strategies x_* and y_* for the first player and the second player, respectively, and the value of game.