Game theory homework 3

1. Players I and II choose integers i and j, respectively, from the set $\{1, 2, \ldots, 7\}$. Player I wins 1 if $|i - j| = 1$. Otherwise there is no payoff. Set up the matrix for this game and solve.

2. Player I secretly chooses one of the numbers 1, 2 and 3, and Player II tries to guess which. If II guesses correctly, she loses nothing; otherwise, she loses the absolute value of the difference between the two numbers. Set up the matrix and then reduce it by dominance to a 2×2 matrix and solve.

3. Consider the following diagonal matrix game.

$$\begin{bmatrix} d_1 & 0 & \cdots & 0 \\ 0 & d_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & d_m \end{bmatrix}.$$

   (a) Suppose one of the diagonal terms is zero. What is the value of the game?

   (b) Suppose one of the diagonal terms is positive and another is negative. What is the value of the game?

   (c) Suppose all diagonal terms are negative. What is the value of the game?

4. Player II chooses a number $j \in \{1, 2, 3, 4\}$ and I tries to guess what it is. If he guesses correctly, he wins 1 from II. If he guesses too high, he wins $1/2$ from II. Otherwise there is no payoff. Set up the matrix for this game and solve.