

1. Solve the games with the following matrices.

(a)

$$\begin{pmatrix} 1 & -1 & -1 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{pmatrix}$$

(b)

$$\begin{pmatrix} 2 & 1 & 1 & 1 \\ 1 & 3/2 & 1 & 1 \\ 1 & 1 & 4/3 & 1 \\ 1 & 1 & 1 & 5/4 \end{pmatrix}$$

(c)

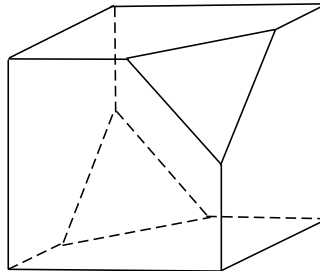
$$\begin{pmatrix} 2 & 0 & 0 & 2 \\ 0 & 3 & 0 & 0 \\ 0 & 0 & 4 & 3 \\ 1 & 1 & 0 & 1 \end{pmatrix}$$

2. Consider a cube in \mathbb{R}^3 . Cut two opposite vertices and get the following set:

$$\{(x, y, z) \in \mathbb{R}^3 : -1 \leq x, y, z \leq 1, |x + y + z| \leq 2\}.$$

(see the picture).

This is a polyhedron. Consider the following game: the first player picks a vertex of the polyhedron, the second player picks one of the faces. If the face contains the vertex, the first player gets \$1 from the second player, else she pays \$1 to the second player. Find the value of the game and some pair of safety strategies.



3. Player II chooses a number $j \in \{1, 2, \dots, n\}$ and I tries to guess what it is. If she guesses correctly, she wins 1. If she guesses too high, she loses 1. If she guesses too low, there is no payoff. Set up the matrix and solve.