

Homework #4

1 Determine the equilibrium strategies for the row and column players when the payoff matrix is given below and determine the value of the game.

2	-3
-5	8

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2 Consider a general 2 x 2 game,

A	B
C	D

Assuming that we do not have dominated strategies, and that $A + D \neq B + C$, define $E = A + D - B - C$.

- (a) Prove that the value of this game is $V = (AD - BC)/E$ by showing that the row player can assure a payout of V by playing row 1 with probability $(D - C)/E$ (and therefore row 2 with probability $(A - B)/E$), and that the column player can assure that same payout by playing column 1 with probability $(D - B)/E$ (and therefore row 2 with probability $(A - C)/E$).
- (b) Verify your answer in problem 1 using this formula.

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3 In the game of Weighted Rock/Paper/Scissors, the game is played in the usual way, but if you win with Rock, you get \$10, if you win with Paper you get \$3, and if you win with Scissors, you get \$1.

- (a) Construct the payoff matrix for this game.
- (b) Verify that the equilibrium strategy for both players is to play Rock, Paper and Scissors with respective probabilities $1/14$, $10/14$, $3/14$.
- (c) What would the equilibrium strategy be if the weights were positive numbers a , b , and c ?

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