Maximin/Minimax

Homework #2

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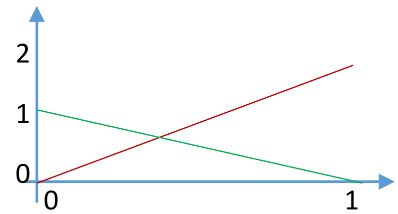
A.

This is a pure coordination game, so the resulting strategies are going to be the same for both of the players. Let us assume that row player plays strategy *a* with probability *p*. That leaves strategy *b* to *1-p*.

Then:



f(p|c) = 2p+0(1-p)

f(p|d) = 0p+1(1-p)

2p+0(1-p) = 0p+1(1-p)

2p = 1-p

p = 1/3

The maximin solution is p = 1/3, and the maximin value is 2·1/3+0(1-p) = 0p+1(1-1/3) = 2/3

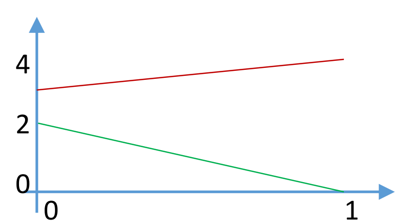
Given the symmetry of the game, both the maximum solution and the maximin value are the same for both players.

B.

This is a modified prisoner's dilemma, where coordination yields more payback than ratting out.

<u>Row player strategy</u>. Let us assume that row player plays strategy *a* with probability *p*. That leaves strategy *b* to *1-p*.

Then:



$f(p|a_2) = 4p+3(1-p)$

$f(p|b_2) = 0p+2(1-p)$

$4p+3(1-p) = 0p+2(1-p)$

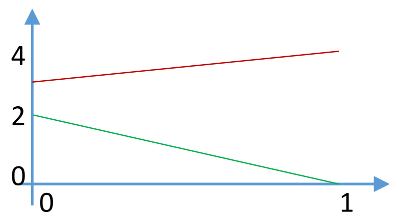
$4p+3-3p = 2-2p$

$3p = -1$

The maximin solution is $p = -1/3 \Rightarrow p = 0$, and the maximin value is $\min(4\cdot0+3(1-0), 0\cdot0+2(1-0)) = 2$.

<u>Column player strategy</u>. Let us assume that column player plays strategy *a* with probability *p*. That leaves strategy *b* to *1-p*.

Then:



$f(p|a_1) = 4p+3(1-p)$

$f(p|b_1) = 0p+2(1-p)$

$4p+3(1-p) = 0p+2(1-p)$

$4p+3-3p = 2-2p$

$3p = -1$

The maximin solution is $p = -1/3 \Rightarrow p = 0$, and the maximin value is $\min(4\cdot0+3(1-0), 0\cdot0+2(1-0)) = 2$.

Given the symmetry of the game, both the maximum solution and the maximin value are the same for both players. It is interesting to see that the maximin strategy does not lead to a payoff as high as if the players would coordinate (both strategies are Nash equilibria).