

first name

last name

student id

each page 8 marks

40 min

closed book

no devices

3 pages

page 1

0. On page 0, in the bubbles, write your ***** CCID *****.

On pages 0, 1, 2, 3, write your first name, last name and student id.

1. In this quiz, Rose is the row player, Colin is the column player,
matrix payoffs are for Rose. Consider this matrix game.

row x -1 2 -1

row y 3 1 2

row z -2 1 -1

a) Which row can Rose ignore as an action choice? _____

Explain why: _____

b) Using a), simplify the matrix.

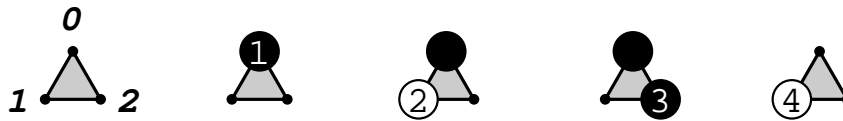
c) Continue from b): consider Colin, simplify the matrix.

d) Continue from c): consider Rose, simplify the matrix again or explain why you cannot.

2. [3 marks] Rose and Colin play this game. What is Rose's expected payoff if she plays $S = (.7, .1, .2)$ and Colin plays $T = (.4, 0, .6)$? (Express your answer as an arithmetic expression: you do not need to simplify.)
- | | | |
|----|---|----|
| 1 | 0 | -2 |
| 3 | 5 | -4 |
| -6 | 7 | 8 |

Rose's expected payoff _____

3. [2+3 marks] The game of go can be played on any graph: *Trigo* is go played on a triangle, say with cells $\{0, 1, 2, \}$. Here is a trigo game: 1.B[0] 2.W[1] 3.B[2] (captures the white stone) 4.W[1] (captures the two black stones) 5.B[pass] 6.W[pass] (game ends, W wins 3-0).



a) Continue the game above with two non-pass moves or explain why this is not possible:

7.B[_____] 8.W[_____] or explain:

b) Give the number of legal trigo positions: _____ Explain:

4. [2+2+4 marks] a) Rose and Colin play this game. Rose wants to find a stochastic minimax strategy (x, y) , so she wants x, y such that (fill in the blanks)

$$\max_{0 \leq x, y \leq 1, x+y=1} \left\{ \min \left\{ \text{_____}, \text{_____} \right\} \right\}.$$

0 1

4 -1

- b) Give the linear program that Rose wants to solve:

- c) Give a Von Neumann equilibrium for this matrix game.

Show your work here:

Your answer: Rose's minimax strategy is (_____ , _____)

Your answer: Colin's minimax strategy is (_____ , _____)

Your answer: game value _____

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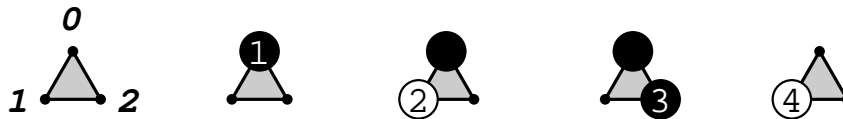
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d) Continue from c): consider Rose, simplify the matrix again or explain why you cannot.

2. [3 marks] Rose and Colin play this game. What is Rose's expected payoff if she plays $S = (.2, .3, .5)$ and Colin plays $T = (.4, 0, .6)$? (Express your answer as an arithmetic expression: you do not need to simplify.)
- | | | |
|----|---|----|
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| 3 | 5 | -4 |
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Rose's expected payoff _____

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0 3

1 -1

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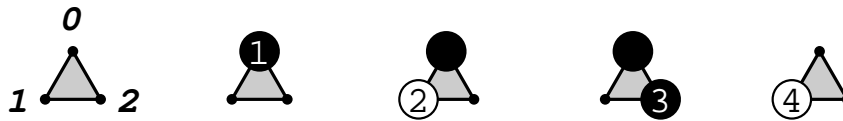
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d) Continue from c): consider Rose, simplify the matrix again or explain why you cannot.

2. [3 marks] Rose and Colin play this game. What is Rose's expected payoff if she plays $S = (.1, .6, .3)$ and Colin plays $T = (.4, 0, .6)$? (Express your answer as an arithmetic expression: you do not need to simplify.)
- | | | |
|----|---|----|
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| 3 | 5 | -4 |
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1 0

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