

# UGEB2530 Games and Strategic Thinking

Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

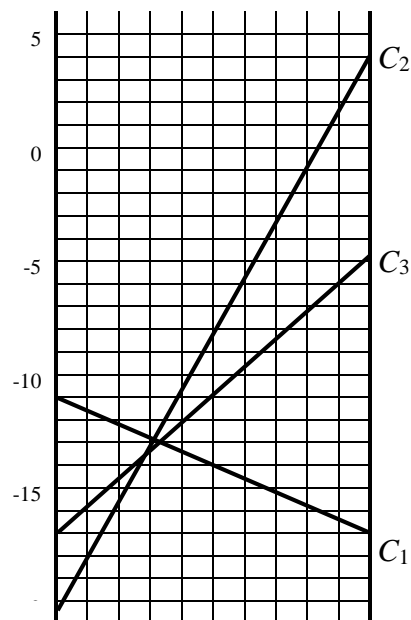
1. Consider the 2-person zero-sum game with game matrix:

$$A = \begin{pmatrix} 17 & 11 \\ -4 & 20 \\ 5 & 17 \end{pmatrix}$$

- a) Write down  $A' = -A^T$

$$A' = \begin{pmatrix} -17 & 4 & -5 \\ -11 & -20 & -17 \end{pmatrix}$$

- b) For each column of  $A'$ , draw a graph of the payoff of row player of  $A'$ .



- c) Write down the  $2 \times 2$  reduced game matrix.

$$\begin{pmatrix} -17 & -5 \\ -11 & -17 \end{pmatrix}$$

d) Find the maximin strategy, minimax strategy and the value of  $A'$ .

$$\text{Maximin strategy: } \mathbf{p}' = \left( \frac{1}{3}, \frac{2}{3} \right)$$

$$\text{Minimax strategy: } \mathbf{q}' = \left( \frac{2}{3}, 0, \frac{1}{3} \right)$$

$$\text{Value of the game: } v' = -13$$

e) Solve the game matrix  $A$ .

$$\text{Maximin strategy: } \mathbf{p} = \left( \frac{2}{3}, 0, \frac{1}{3} \right)$$

$$\text{Minimax strategy: } \mathbf{q} = \left( \frac{1}{3}, \frac{2}{3} \right)$$

$$\text{Value of the game: } v' = 13$$

2. Consider the following game matrix.

$$A = \begin{pmatrix} 3 & 5 & 6 & 4 \\ 4 & 8 & 7 & 5 \\ 6 & 3 & 1 & 2 \\ 2 & 1 & 3 & 4 \end{pmatrix}$$

a) Write down the matrix obtained by deleting all dominated strategies.

$$\begin{pmatrix} 4 & 7 & 5 \\ 6 & 1 & 2 \end{pmatrix}$$

b) Draw the graph of the expected payoff of row player for each undominated strategies of column player.

c) Solve the game matrix  $A$ .

Maximin strategy of row player: (0,0.8,0.2,0)

Minimax strategy of column player: (0.6,0,0,0.4)

Value of the game: 4.4