Game Theory – Q1 [14 marks](28/5/21)

Exam Boards

OCR : D (Year 1)

MEI: -

AQA: D (Year 1)

Edx: D2 (Year 2)

(i) The following pay-off matrix is for a zero-sum game (from player 1's point of view).

Player 2: Player 1	A	B	C	D
A	4	3	2	0
B	3	3	-1	-2
C	-2	2	3	1

Use the idea of dominance to reduce the matrix as much as possible. [4 marks]

(ii) Identify the play-safe strategies for players 1 and 2. Explain whether or not there is a stable solution. [5 marks]

(iii) What will be the outcome of the game if:
(a) both players play safe
(b) player 1 plays safe, and player 2 hears of player 1's intention
(c) player 2 plays safe, and player 1 hears of player 2's intention

[5 marks]

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[5 marks]

Solution

(i) Row A dominates row B, and column D dominates columns B and C (as player 2 will always prefer D to B or C). [3 marks]

The reduced matrix is:

Player 2: Player 1	A	D
A	4	0

C	-2	1

[1 mark]

(ii)

Player 2: Player 1	A	D	row min.
A	4	0	(0)
C	-2	1	-2
col. max.	4	(1)	

[2 marks]

The play-safe strategy for player 1 is A, and for player 2 it is D.

[2 marks]

As the min. of the col. maxima does not equal the max. of the row minima, there is no stable solution. [1 mark]

(iii)(a) neither player wins anything [1 mark]

(b) player 1 chooses A and player 2 then chooses D, so that neither player wins anything [2 marks]

(c) player 2 chooses D and player 1 then chooses C, so that player 1 wins 1 and player 2 loses 1 [2 marks]