

QQQ – Decision 2 – Chapter 6 – Game Theory (Version 2)

Total Marks: 22

(22 = Platinum, 20 = Gold, 18 = Silver, 15 = Bronze)

1. Anna (A) and Roland (R) play a two-person zero-sum game which is represented by the following pay-off matrix for Anna.

	R plays 1	R plays 2	R plays 3
A plays 1	6	-2	-3
A plays 2	-3	1	2
A plays 3	5	4	-1

Formulate the game as a linear programming problem **for player R**. Write the constraints as inequalities. Define your variables clearly.

(8)

(Total 8 marks)

2. A two-person zero-sum game is represented by the following pay-off matrix for player A .

	B plays X	B plays Y
A plays Q	2	-2
A plays R	-1	5
A plays S	3	4
A plays T	0	2

- (a) (i) Show that this game is stable.
(ii) State the value of this game to player B . (3)

Option S is removed from player A 's choices and the reduced game, with option S removed, is no longer stable.

- (b) Write down the reduced pay-off matrix for player B . (1)

Let B play option X with probability p and option Y with probability $1 - p$.

- (c) Use a graphical method to find the optimal value of p and hence find the best strategy for player B in the reduced game. (6)
- (d) (i) Find the value of the reduced game to player A .
(ii) State which option player A should never play in the reduced game.
(iii) Hence find the best strategy for player A in the reduced game. (4)

(Total 14 marks)