

QQQ – Decision 2 – Chapter 6 – Game Theory (Version 1)

Total Marks: 24

(24 = Platinum, 22 = Gold, 19 = Silver, 16 = Bronze)

1. Layla and Mohsin play a zero-sum game represented by the following pay-off matrix for Layla.

	Mohsin plays X	Mohsin plays Y	Mohsin plays Z
Layla plays P	1	−2	2
Layla plays Q	−4	3	−5
Layla plays R	−1	1	−3

- (a) (i) Find the play-safe strategies for each player.
- (ii) State, giving a reason, whether there is a stable solution to this game. (3)
- (b) Option R is now removed from Layla's choices.
- (i) For each of Mohsin's three options, find the expected pay-off to Layla when she plays options P and Q equally often. (1)
- (ii) Use a graphical method to determine Layla's optimal mixed strategy. You should define any variables you use. (7)

(Total 11 marks)

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

	B plays 1	B plays 2	B plays 3	B plays 4
A plays 1	-3	2	5	-1
A plays 2	-5	3	1	-1
A plays 3	-2	5	4	2
A plays 4	2	-3	-1	4

(a) Identify the play safe strategies for each player. (3)

(b) State, giving a reason, whether there is a stable solution to this game. (1)

(c) Explain why the game above can be reduced to the following 3×3 game.

-3	2	5
-2	5	4
2	-3	-1

(2)

(d) Formulate the 3×3 game as a linear programming problem for player A, defining your variables clearly and writing the constraints as inequalities. (7)

(Total 13 marks)