Game Theory

Example 10.1. Suppose that Rosemary and Colin each have 2 cards, labelled with a 1 and a 2. Each selects a card and then both reveal their selected cards. If the sum s of the numbers on their cards is even, then Rosemary wins and Colin must pay her this s. Otherwise, Colin wins and Rosemary must pay him s.

Example 12.1. Suppose that Rosemary and Colin are working on a joint project. Each of them can choose to "work hard" or "goof off." Both of them must work hard together to receive a high mark for the project. Both have utility 3 for receiving a high mark utility 1 for goofing off (regardless of what mark they receive) and utility 0 for working hard but not receiving a high mark. Give the payoff matrix for this game.

One more example

Example 10.3. Rosemary and Colin each have a £1 and a £2 coin. They each select one of them and hold it in their hand, then Colin calls out "even" or "odd" and they reveal their coins. Let s be the sum of the values of the coins. If Colin correctly guessed whether s was even or odd, he wins both coins. Otherwise, Rosemary wins both coins.

What are the strategies for each player?
Write down payoff matrix?
Is this a zero-sum game?

t)

Example 10.4. Suppose we seek a pair of strategies (r_i, c_j) that form a Nash equilibrium for the game with the following payoff matrix:

	c_1	c_2	c_3	c_4	c_5
r_1	2	−3	−3	12	−5
r_2	2	7	2	9	11
r_3	−1	4	0	1	0
r_4	−3	5	1	2	−3

Can you find a Nash equilibrium?
How many can you find

Example matching pennies

Example 10.5. Rosemary and Colin each have a 1p coin. Simultaneously, they place their coins on the table with either heads or tails showing. If the coins match, Rosemary wins £1 from Colin. Otherwise, Colin wins £1 from Rosemary.

i