UGEB2530 Game and strategic thinking
Assignment 1

Due:26 Jan 2014 (Monday)

1. Find all pure Nash equilibria of the following games.

   (a) $\begin{pmatrix} (4,-4) & (1,-2) \\ (3,5) & (-2,7) \end{pmatrix}$

   (b) $\begin{pmatrix} (5,3) & (1,-2) \\ (3,0) & (4,5) \end{pmatrix}$

2. There is a 4-face dice and the numbers on the 4 faces are 1,1,2 and 3 respectively. The dice is thrown once.

   (a) Find the expected value of the number at the bottom.

   (b) Find the expected value of the square of the number at the bottom.

3. In a rock-paper-scissors game, the loser pays the total number of fingers in the two gesture to the winner. The payoffs of the players are 0 if there is a draw.

   (a) Write down the game matrix (payoff of player 1) of the game. (Use rock, paper, scissors, as the order of strategies.)

   (b) Suppose player 1 uses $(0.2, 0.3, 0.5)$ and player 2 uses $(0.3, 0.4, 0.3)$. Find that expected payoff of player 1.

   (c) If player 1 uses $(0.2, 0.3, 0.5)$, what is the best strategy of player 2.

   (d) If player 2 uses $(0.3, 0.4, 0.3)$, what is the best strategy of player 1.

4. In a game, two players call out one of the numbers 1,2, or 3 simultaneously. Let S be the sum of the two numbers. If S is even, then player 2 pay S dollars to player 1. If S is odd, then player 1 pay S dollars to player 2.

   (a) Write down the game matrix for the payoff of player 1.

   (b) Write down the game matrix for the payoff of player 2.

   (c) Find the expected payoff of player 1 if player 1 calls out the numbers 1,2,3 with probabilities 0.3,0.2,0.5 respectively, and player 2 calls out the numbers 1,2,3 with probabilities 0.6,0.1,0.3 respectively.

   (d) Suppose player 2 calls out the numbers 1,2,3 with probabilities 0.6,0.1,0.3 respectively. What is the best strategy for player 1 and what is his expected payoff if he uses this strategy?

<div align="center">End of paper</div>