Operations Research 2

Tutorial Sheet 2

1. a) Consider the following asymmetric Cournot game. Firm i produces x_i units. Firm 1 has costs $1000 + 2x_1$, while Firm 2 has costs $500 + 3x_2$. The price when the total supply is x satisfies $p = 6 - \frac{x}{2000}$. Find the equilibrium levels of production, profits and price.

b) Find the equilibrium levels of production, profits and price for the Stackelberg version of the game in which Player 1 is the leader.

2. Consider the following symmetric game

	A	B
A	(10,10)	(0,5)
B	(5,0)	(6,6)

i) Derive all the Nash equilibria of the game.
ii) Is there a payoff dominant pure Nash equilibrium?
iii) Is there a risk dominant pure Nash equilibrium?

3. Find the Nash equilibria of the standard rock-scissors-paper game given below.

	R	S	P
R	(0,0)	(1,-1)	(-1,1)
S	(-1,1)	(0,0)	(1,-1)
P	(1,-1)	(-1,1)	(0,0)

4. In the battle of the sexes game, the female wishes to go to a concert while the male wishes to go to a film. Their possible actions are C and F and the payoff matrix is given by

	C	F
C	(5,2)	(0,0)
F	(0,0)	(1,6)

i) Derive all the Nash equilibria of the game.
ii) Is there a payoff dominant pure Nash equilibrium?
iii) Is there a risk dominant pure Nash equilibrium?