MA152 Spring 2017

Homework 6

Due: 31st May at 4PM in APM basement

1. Find the safety levels for the bimatrix games

   (a)
   $$\begin{pmatrix} (1,1) & (5,0) \\ (0,5) & (4,4) \end{pmatrix}$$

   (b)
   $$\begin{pmatrix} (3,10) & (1,5) \\ (2,0) & (4,20) \end{pmatrix}$$

2. Two players are playing *Chicken*. Each player may either choose to be a "chicken" or be "brave". If both players choose "chicken", the payoff to both players is 1. If both players choose to be "brave" the payoff is -2 to both players. Finally, if one player chooses to be "chicken" and the other player chooses to be "brave", then the player choosing "brave" has payoff 2 and the player choosing "chicken" has payoff -1. Find three strategic equilibria.

3. A coin with probability 2/3 of heads and 1/3 of tails is tossed and the outcome is shown to Player I but not to Player II. Player I then makes a claim which may be true or false that the coin turned up heads or that the coin turned up tails. Then, Player II, hearing the claim, must guess whether the coin came up heads or tails. Player II wins 3 if his guess is correct, and nothing otherwise. Player I wins 3 if I has told the truth in his claim. In addition, Player I wins an additional 6 if Player II guesses heads. Draw the Extensive Form for this game, and convert it into the strategic form (you do not need to solve the game).

4. Consider the Cournot model where there are three firms, with productions q_1, q_2, q_3. All three firms decide on their production amounts simultaneously, without knowledge of each other. The price of 1 unit of the product is given by $P = (a - q_1 - q_2 - q_3)^+$, where a is a fixed constant. The cost of production for Firm i is given by cq_i, for some fixed constant c. Find the strategic equilibrium, and the payoffs to the three firms.

5. Consider a Stackelberg model where there are three firms, with productions q_1, q_2, q_3. Firm I announces q_1 first, followed by Firm II announcing q_2, and finally Firm III announces q_3. Each unit of production is sold at the price $P = (a - q_1 - q_2 - q_3)^+$, where a is a fixed constant. The cost of production for Firm i is given by cq_i, for some fixed constant c. What is the strategic equilibrium?