FIRST MIDTERM EXAM
Econ 4011, Fall 2011

Do all questions. The questions have equal weight. You have 1hr and 23minutes.

1. Dominance and Equilibrium

Two players must choose one of three colors Red, Green or Blue. The payoffs are symmetric and given by

	R	G	B
R	10,10	3,9	0,0
G	9,3	1,1	2,2
B	0,0	2,2	1,1

a. Are any strategies weakly or strictly dominated? Can you apply iterated dominance of either sort?
b. What are the Nash equilibrium?
c. What can you say about the Pareto efficiency of the Nash equilibria?
Now a great philanthropist comes along and says "It seems unfair that Green receives such low payoffs relative to Red, when it is a much nicer color. Being that I am rich I will pay a bonus of 3 to anyone who plays Green." Write the game taking account of the philanthropists contributions.
a. Are any strategies weakly or strictly dominated? Can you apply iterated dominance of either sort?
b. What are the Nash equilibria?
c. What can you say about the Pareto efficiency of the Nash equilibria?
Are the players better off as a result of the contributions of the philanthropist? Does the philanthropist lose money as a result of her generosity?

2. Third Price Auction

A set of six paintings is being auctioned off using a third price auction. Peter, Bjorn and John are the players interested in obtaining the set. Peter gets a payoff of 1 from getting the set of paintings, Bjorn gets 2 while John values it the most at 3. Each player can bid one of the following values, 1, 2, 3 or 4. The set of paintings is divided equally among the set of highest bidders. So if Bjorn and John are the highest bidders, they both get three paintings each with payoffs 1 and $1\frac{1}{2}$, respectively. Bjorn and John must also pay the third highest bid *each*, which in this case would be Peter's bid.

(a) Would each player bidding their own value constitute a Nash Equilibrium? Explain your answer.
(b) Construct a Nash Equilibrium in which John gets all six paintings.

(c) Is there a Nash Equilibrium in which Peter gets all six paintings? If so, write down the bids for such an equilibrium.

3. Cournot Duopoly

Unbalance and Contrapositive are the leading producers of slippers. The market demand function for pairs of slippers is given by $p = 120 - 3x$. The number of pairs of slippers produced by Unbalance and Contrapositive are denoted by x_U and x_C, respectively. Remember, $x = x_U + x_C$. The cost functions for Unbalance and Contrapositive are $2\,x_U$ and $7\,x_C$, respectively. The two firms can choose any positive level of production.

(a) Write down the profit equations for Unbalance and Contrapositive.
(b) Write down the reaction (best response) functions.
(c) What are the Nash Equilibria choices of x_U and x_C.
(P.S. Assume, for now, that fractions of slippers can in fact be produced and sold!)