Homework 3

1. Argue that (a_2, b_2) is the unique Nash equilibrium of the following game:

	b_1	b_2	b_3	b_4
a_1	0,7	2,5	7,0	0,1
a_2	5,2	3,3	5,2	0,1
a_3	7,0	2,5	0,7	0,1
a_4	0,0	0,-2	0,0	10,-1

2. Find all the perfect equilibria of the following game:

	A	B	C
A	0,0	0,0	0,0
B	0,0	1,1	2,0
C	0,0	0,2	2,2

3. Show that the set $NE(G^\epsilon)$ is nonempty for any ϵ s.t. $\epsilon^i_j > 0 \quad \forall i, j$ and $\sum_j \epsilon^i_j < 1 \quad \forall i$.

Hint: Define a correspondence $BR^i_\epsilon(s)$ from S_ϵ to S_ϵ and show that the conditions of Kakutani's Fixed Point Theorem are satisfied.

4. (a) A mixed strategy profile is undominated if no player is using a weakly dominated strategy. Show that if s is a perfect equilibrium, then it is also undominated.

(b) Is the converse true? That is, is an undominated Nash equilibrium perfect? Prove the statement or come up with a counter-example.

5. Find all the mixed strategy NE of this game, where $0 < \gamma < 1$:

	A	B	C
A	γ, γ	1,-1	-1, 1
B	-1, 1	γ, γ	1, -1
C	1,-1	-1, 1	γ, γ

6. Consider the following game:

	A	B
A	2,2	-100,0
B	0,-100	1,1

Find the unique mixed strategy NE, and argue that it is not ESS.

7. Is a pure strategy NE always strict? Why or why not?

8. (a) In a Hawk-Dove game discussed in class with $c > 1$, argue that the unique symmetric mixed strategy NE will survive an $\epsilon-$invasion of doves.

(b) Find all the ESS in a Hawk-Dove game discussed in class with $c < 1$ or argue that none exist.