EE 693H Homework #1 due Tuesday, 9/11/07

QUESTIONS

1. Consider the zero-sum game characterized by the matrix A

$\mathcal{P}_2$:

$\mathcal{P}_1$ \ $\mathcal{P}_2$	1	2	3	4	5	6
1	-1	1	-1	1	2	0
2	0	-2	1	0	-1	1
3	0	0	0	2	3	1
4	-1	3	2	1	0	2

   (a) Iteratively eliminate all strictly dominated rows and columns.

   (b) Find $\underline{V}(A)$, $\overline{V}(A)$, and all pure security strategies.

   (c) Find $V_m(A)$, and all mixed security strategies for both players by the graphical solution method.

2. Consider the zero-sum game characterized by the matrix A

$\mathcal{P}_2$:

$\mathcal{P}_1$ \ $\mathcal{P}_2$	1	2	3	4	5	6
1	-1	1	-1	1	2	0
2	2	-2	1	0	-1	1
3	1	1	0	2	2	1
4	-1	3	2	1	0	2
5	1	-3	2	-1	0	4

   (a) Find $\underline{V}(A)$, $\overline{V}(A)$, and all pure security strategies.

   (b) Find $V_m(A)$, and all mixed security strategies for both players by the LP approach.

3. Consider the zero-sum game characterized by A

$\mathcal{P}_2$:

$\mathcal{P}_1$ \ $\mathcal{P}_2$	1	2	3	J
1	1	-1	-1	1
2	-1	1	-1	1
3	-1	-1	1	1
J	1	1	1	-1

   (a) Find a saddle-point mixed equilibrium in which each player assigns positive probability to each of her actions and assigns the same probability to the actions 1, 2, and 3.

   (b) Show that the equilibrium you found in the first part is the only equilibrium of the game.

4. Show that the set of all mixed saddle-point strategies of a player in a zero-sum game is nonempty, bounded, convex and closed.

5. Consider a zero-sum game characterized by a matrix A that satisfies $A = -A^T$. Show that (i) the sets of all mixed saddle-point strategies of player 1 and player 2 are the same, and (ii) $V_m(A) = 0$.

6. Either prove or give a counterexample to the claim that if the equilibrium payoff of player 1 in a zero-sum game is v , then any strategy profile that gives player 1 a payoff of v is an equilibrium.