Chapter 4 Mixed Strategy Nash Equilibrium

1. Compute the Mixed Strategy Nash Equilibria by graphing the best response functions for these games :

	L	R
U	$3,7$	$6,4$
D	$5,1$	$2,8$

	L	R
U	$6,7$	$3,4$
D	$2,1$	$5,8$

2. Exercise 101.1 (Variant of Matching Pennies) Find the steady state(s) of the game that differs from Matching Pennies only in that the outcomes of (Head, Head) and of (Tail, Tail) are that player 1 gains \$2 and player 2 loses \$1.

3. EXERCISE 114.1 (Mixed strategy equilibria of Hawk-Dove) Consider the two-player game with vNM preferences in which the players' preferences over deterministic action profiles are the same as in Hawk-Dove (Exercise 31.2) and their preferences over lotteries satisfy the following two conditions. Each player is indifferent between (i) the outcome (Passive, Passive) and (ii) the lottery that assigns probability $\frac{1}{2}$ to (Aggressive, Aggressive) and probability $\frac{1}{2}$ to the outcome in which she is aggressive and the other player is passive; each player is indifferent also between (i) the outcome in which she is passive and the other player is aggressive and (ii) the lottery that assigns probability $\frac{2}{3}$ to the outcome (Aggressive, Aggressive) and probability $\frac{1}{3}$ to the outcome (Passive, Passive). Find payoffs whose expected values represent these preferences (take each player's payoff to (Aggressive, Aggressive) to be 0 and each player's payoff to the outcome in which she is passive and the other player is aggressive to be 1). Find the mixed strategy Nash equilibrium of the resulting strategic game.

4. EXERCISE 114.2 (Games with mixed strategy equilibria) Find all the mixed strategy Nash equilibria of the strategic games in Figure 114.1.

	L	*R*
T	6,0	0,6
B	3,2	6,0

	L	*R*
T	0,1	0,2
B	2,2	0,1

Figure 114.1 Two strategic games with vNM preferences.

5. EXERCISE 114.3 (A coordination game) Two people can perform a task if, and only if, they both exert effort. They are both better off if they both exert effort and perform the task than if neither exerts effort (and nothing is accomplished); the worst outcome for each person is that she exerts effort and the other person does not (in which case again nothing is accomplished). Specifically, the players' preferences are represented by the expected value of the payoff functions in Figure 115.1, where c is a positive number less than 1 that can be interpreted as the cost of exerting effort. Find all the mixed strategy Nash equilibria of this game. How do the equilibria change as c increases? Explain the reasons for the changes.

	No effort	*Effort*
No effort	$0,0$	$0,-c$
Effort	$-c,0$	$1-c,1-c$

Figure 115.1 The coordination game in Exercise 114.3.