Exercise 6

Game Theory

1. What is a Nash equilibrium? Why would strategies that *do not* constitute a Nash equilibrium be an unlikely outcome of a game?

2. What is special about the prisoners' dilemma game? Is every game presented in this chapter a prisoners' dilemma?

14.4. Coca-Cola and Pepsi are competing in the Brazilian soft-drink market. Each firm is deciding whether to follow an aggressive advertising strategy, in which the firm significantly increases its spending on media and billboard advertising over last year's level, or a restrained strategy, in which the firm keeps its advertising spending equal to last year's level. The profits associated with each strategy are as follows:

		Pepsi	
		Aggressive	**Restrained**
Coca-Cola	**Aggressive**	\$100, \$80	\$170, \$40
	Restrained	\$80, \$140	\$120, \$100

What is the Nash equilibrium in this game? Is this game an example of the prisoners' dilemma?

14.4 b) Does any player have a dominant strategy?

14.7. Consider the following game:

		Player 2	
		Left	**Right**
Player I	**Up**	1, 4	−100, 3
	Down	0, 3	0, 2

a) What is the Nash equilibrium in this game?

14.7 b) Suppose Player 1 is risk-averse, will he choose the NE strategy from Part a? Why or why not?

14.7 c) Suppose Player 1 opts for the Maximin criterion. What strategy will he choose?

14.7 d) Suppose Player 2 anticipates this. What is the outcome of the game?

14.6. Asahi and Kirin are the two largest sellers of beer in Japan. These two firms compete head to head in the dry beer category in Japan. The following table shows the profit (in millions of yen) that each firm earns when it charges different prices for its beer:

		Kirin			
		¥630	¥660	¥690	¥720
Asahi	¥630	180, 180	184, 178	185, 175	186, 173
	¥660	178, 184	183, 183	192, 182	194, 180
	¥690	175, 185	182, 192	191, 191	198, 190
	¥720	173, 186	180, 194	190, 198	196, 196

a) Does Asahi have a dominant strategy? Does Kirin?

b) Both Asahi and Kirin have a dominated strategy: Find and identify it.

c) Assume that Asahi and Kirin will not play the dominated strategy you identified in part (b) (i.e., cross out the dominated strategy for each firm in the table). Having eliminated the dominated strategy, show that Asahi and Kirin now have another dominated strategy.

d) Assume that Asahi and Kirin will not play the dominated strategy you identified in part (c). Having eliminated this dominated strategy, determine whether Asahi and Kirin now have a dominant strategy.

e) What is the Nash equilibrium in this game?

14.6 f) Consider the full game without eliminating any dominated strategy. Suppose both players use the Maximin criterion. What is the outcome of the game?

14.22 Consider the following capacity expansion game.

		Pipetran	
		No Expansion	Small
Starline	No Expansion	40, 18	28, 22
	Small	48, 14	32, 16
	Large	38, 10	24, 5

14.22 a) Find the NE if this game is played simultaneously.

14.22 b) Suppose Starline moves first. Does it have a first-mover advantage.

14.22 c) Suppose Pipetran moves first. Does it have a first-mover advantage.

(Hint 1:You should draw a game tree and use backward induction when solving sequential games.)

(Hint 2:You should be careful when looking at the payoffs of the leader and the follower.)