

## Problem Set 1

Due in class Wednesday, February 23

### From Dutta

CH 3: Exercises 1, 2, 8 - 10, 11 - 14  
CH 5: Exercises 5.7 - 5.13

### Additional Exercises

1. Determine the set of strategies that survive IEDS for each of the following games. (Note that some of the games might not go all the way to a unique solution. In that case, simply show how far you can go with IEDS. This is what is meant by “finding the set of strategies that survive IEDS.”)

		PLAYER 2	
		L	R
PLAYER 1	U	3,10	4,1
	D	6,4	8,5

**(a)**

		PLAYER 2	
		L	R
PLAYER 1	U	8,10	4,1
	D	6,4	8,5

**(b)**

		PLAYER 2			
		A	B	C	D
PLAYER 1	W	5,4	4,4	4,5	12,2
	X	3,7	8,7	5,8	10,6
	Y	2,10	7,6	4,6	9,5
	Z	4,4	5,9	4,10	10,9

**(c)**

		PLAYER 2	
		L	R
PLAYER 1	U	0,4	4,0
	M	3,3	3,3
	D	4,0	0,4

**(d)**

		PLAYER 2		
		L	C	R
PLAYER 1	U	2,0	1,1	4,2
	M	3,4	1,2	2,3
	D	1,3	0,2	3,0

**(e)**

		PLAYER 2		
		L	C	R
PLAYER 1	U	8,6	0,1	8,2
	M	1,0	2,6	5,1
	D	0,8	1,0	4,4

**(f)**

2. Suppose that you manage a firm and are engaged in a dispute with one of your employees. The process of dispute resolution is modeled by the following game, where your employee chooses either to “settle” or to “be tough in negotiation” and you choose either to “hire an attorney” or to “give in.”

		YOU	
		Give in	Hire attorney
EMPLOYEE	Settle	1,2	0,1
	Be tough	3,0	$x$ , 1

In the cells of the matrix, your payoff is listed second;  $x$  is a number that both you and the employee know. Under what conditions might “give in” be a rational strategy choice for you?

3. Consider the three major network-affiliate television stations serving Waterville: WLBZ, WABI, and WMTW. All three stations have the option of airing the evening news program live at 6 pm or in a delayed broadcast at 7 pm. Each station's objective is to maximize its viewing audience in order to maximize its advertising revenue. The following normal-form representation describes the share of Waterville's total population that is "captured" by each station as a function of the times at which the news programs are aired. The stations make their choices simultaneously. The payoffs are listed according to the order WLBZ, WABI, WMTW. Find the set of strategies that survive IEDS in this game.

		WABI				WABI	
		6:00	7:00			6:00	7:00
WLBZ	6:00	14,24,32	8,30,27	WLBZ	6:00	16,24,30	30,16,24
	7:00	30,16,24	13,12,50		7:00	30,23,14	14,24,32

WMTW

4. The following question asks you to write down and analyze a simple model that describes a plausible (though simplified) real-world situation. Suppose that you are off campus and about to be late for Game Theory class; in order to arrive on time, you decide that you must drive above the speed limit (something you would otherwise NEVER do...). You have two choices on how to return to campus: Mayflower Hill Drive or North Street. Unfortunately for you, there is a policeman out looking for speeders. The policeman's goal is to catch a speeder and write him/her a \$50 speeding ticket in order to generate revenue for the local police station. The policeman can patrol either Mayflower Hill Drive OR North Street, but not both.
- Model this game in the normal form; i.e. draw a matrix that represents this game.
  - Describe solutions (if any) to this game according to the three solutions concepts we have defined so far: (i) Dominant Strategies, (ii) IEDS, and (iii) Nash Equilibrium. Provide the intuition behind your answer to each of (i) – (iii).
  - In parts (a) and (b), we assumed that you would drive above the speed limit in order to avoid being late for class. Now suppose we modify the game to allow you an additional option: drive at the speed limit, which will result in you being late for class with certainty. Assuming that there is some negative payoff to walking into class late, how does this modification change your answers to (a) and (b)? Be sure to draw a new matrix to represent this new game.