

Game Theory: Exercise 3

Khakestari

October 14, 2013-10-14

Exercise 1

For the game illustrated in FIGURE PR7.6, find all mixed-strategy Nash equilibria.

FIGURE PR7.6

		Player 2		
		<i>x</i>	<i>y</i>	<i>z</i>
Player 1	<i>a</i>	2,3	1,4	3,2
	<i>b</i>	5,1	2,3	1,2
	<i>c</i>	3,7	4,6	5,4
	<i>d</i>	4,2	1,3	6,1

Exercise 2

Suppose that two people decide to form a partnership firm. The revenue of the firm depends on the amount of effort expended on the job by each person and is given by:

$$r(e_1, e_2) = a_1 e_1 + a_2 e_2$$

Where e_1 is the effort level of person 1 and e_2 is the effort level of person 2. The numbers a_1 and a_2 are positive constants. The contract that was signed by the partners stipulates that person 1 receives a fraction t (between 0 and 1) of the firm's revenue and person 2 receives a $1-t$ fraction. That is, person 1 receives the amount $tr(e_1, e_2)$, and person 2 receives $(1-t)r(e_1, e_2)$. Each person dislikes effort, which is measured by a personal cost of e_1^2 for person 1 and e_2^2 for person 2. Person i 's utility in this endeavor is the amount of revenue that this person receives, minus the effort cost e_i^2 . The effort levels (assumed nonnegative) are chosen by the people simultaneously and independently.

- Define the normal form of this game (by describing the strategy spaces and payoff functions).
- Using dominance, compute the strategies that the players rationally select (as a function of t , a_1 , and a_2).
- Suppose that you could set t before the players interact. How would you set t to maximize the revenue of the firm?

Exercise 3

Pure strategies that are only strictly dominated by a mixed strategy
 Consider the following normal form game

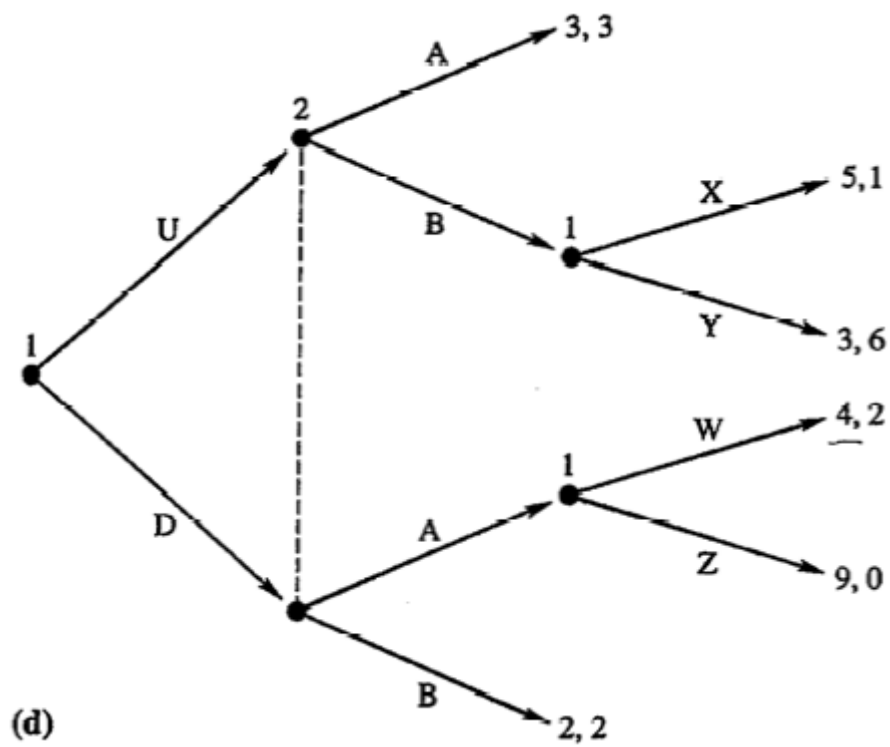
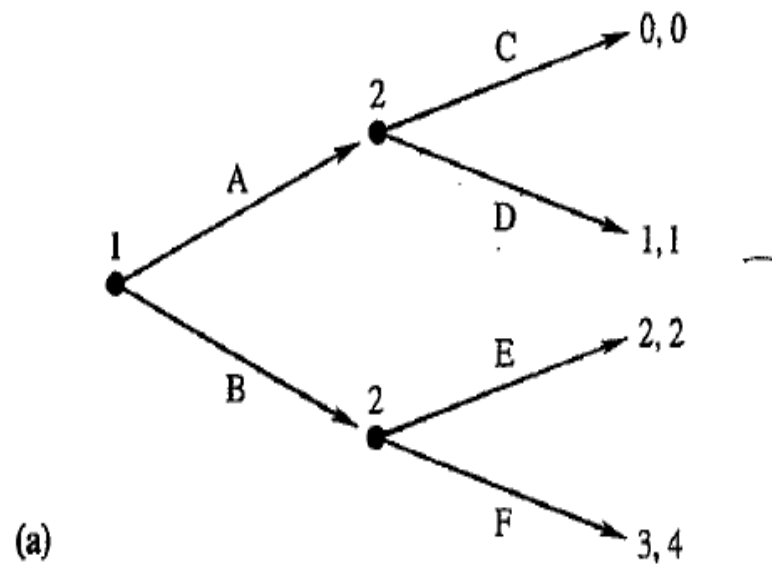
		Player 2	
		<i>Left</i>	<i>Right</i>
Player 1	<i>Up</i>	4,1	0,2
	<i>Middle</i>	0,0	4,1
	<i>Down</i>	1,3	1,2

Is there some strictly dominated strategy for player 1 involving only the use of pure strategies?

Is there some strictly dominated strategy for player 1 when mixed strategies are allowed? [Hint: you may assign probabilities to two of her strategies, similarly as we did in class].

Exercise 4

Draw the normal-form matrix of each of the following extensive-form games.



Exercise 5

In the extensive-form game pictured at the top of the next page, how many strategies does player 2 have?

