Homework 7: Linear Programming for Finding Nash Equilibria in Zero-Sum Games

	R	P	S
R	0, 0	-2, 2	3, -3
P	2, -2	0, 0	-1, 1
S	-3, 3	1, -1	0, 0

Part I. Consider the Rock-Paper-Scissor game in Homework #6 again as shown above. In the following, find a Nash equilibrium **based on the general linear programming approach** explored in the class and in Sections 11.1~11.3 of *Linear Programming: Foundations and Extensions*, *2nd ed.*

1. Describe the linear program (in terms of AMPL code) in terms of **payoffs of Player #2** to find the security strategy x* (i.e.) for **Player #2**. What is the mixed strategy x* you got when you solve the linear program? What is the optimal solution value (i.e. the **max min** value received by **Player #2**)?
2. Describe the linear program (in terms of AMPL code) in terms of **payoffs of the Player #2** to find the security strategy y* (i.e.) for **Player #1.** What is the mixed strategy y* you got when you solve the linear program? What is the optimal solution value (i.e. the **min max** value received by **Player #2**)?
3. When player #1 adopts y* and player #2 adopts x* as their strategies, what is the expected payoff for Player #1 and what is the expected payoff for Player #2 respectively? Explain why (y*, x*) forms a Nash equilibrium.

Part II. Do the Step 1 and Step 2 as described in Part I above to find a Nash equilibrium (x*, y*) for the zero-sum game below.

1 \ 2	L	M	R
U	-1, 1	4, -4	7, -7
D	2, -2	-3, 3	-9, 9