Econ 327: Game Theory
Homework #5

University of Oregon

Due: Nov. 7th

Question:	**Q1**	**Q2**	**Q3**	Total
Points:	16	12	16	44
Score:				

For homework assignments:

- Complete *all* questions and parts.

- You will be graded on not only the content of your work but on how clearly you present your ideas. Make sure that your handwriting is legible. Please use extra pages if you run out of space but make sure that all parts of a question are in the correct order when you submit.

- You may choose to work with others, but everyone must submit to Canvas individually.

  Please include the names of everyone who you worked with below your own name.

Name _____

Q1. Follow the steps for the game below:

		P_2	
		B	D
P_1	J	6,6	4, 0
	K	0,3	10,15

(a) [4 points] Define mixed strategies for each player. Make sure to define all variables you introduce.

(b) [4 points] Graph Player 1's expected utilities as functions of Player 2's mixed strategy you defined in part (a).

(c) [4 points] Graph Player 2's expected utilities as functions of Player 1's mixed strategy you defined in part (a).

(d) [4 points] Solve for all Nash equilibria in this game (mixed and pure strategies). A complete answer will include all calculations used and a graph of best response functions.

Q2. Consider the strategic form game below:

		P_2		
		Left	**Center**	**Right**
P_1	**Top**	3 , 1	3 , 2	0 , 2
	Middle	1 , 2	2 , 1	1 , 2
	Bottom	0 , 2	3 , 2	3 , 1

(a) [4 points] Find any **pure strategy** Nash equilibria

(b) [4 points] Consider the following mixed strategy profile:
  - Player 1 plays 1/3 **Top**, 1/3 **Middle**, and 1/3 **Bottom**
  - Player 2 plays 1/3 **Left**, 1/3 **Center**, 1/3 **Right**

  Check whether this is a **mixed strategy Nash equilibrium** and explain why or why not.

(c) [4 points] Now consider the strategy profile:
  - Player 1 plays 1/3 **Top**, 1/3 **Middle**, and 1/3 **Bottom**
  - Player 2 plays 1/2 **Left**, 0 **Center**, 1/2 **Right**

  Check whether this is a **mixed strategy Nash equilibrium** and explain why or why not.

Q3. Consider the following game:[1]

		Colin	
		Yes	No
	Yes	x,x	0,1
Rowena	No	1,0	1,1

(a) [4 points] For what values of x does this game have a unique Nash equilibrium? What is that equilibrium?

(b) [4 points] For what values of x does this game have a mixed strategy equilibrium? With what probability, expressed in terms of x does each player play Yes in this mixed-strategy equilibrium?

(c) [4 points] Let $x = 3$. Graph the best-response curves of Rowena and Colin against each other's mixed strategy probability on the same graph. Label all Nash equilibriua in pure and mixed strategies.

(d) [4 points] Let $x = 1$. Graph the best-response curves of Rowena and Colin against each other's mixed strategy probability on the same graph. Label all the Nash equilibria in pure and mixed strategies.

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[1]Dixit, Skeath, & McAdams, *Games of Strategy*, 4th Edition