POLS 308: Game Theoretic Methods in Political Science (Spring 2017)
Professor Ahmer Tarar   NAME:_____
Homework Assignment #1 (due at beginning of class on **Monday, February 6**)

Instructions: This homework assignment consists of 7 problems. The first 4 problems should be answered on this question sheet. The remaining 3 problems (which are from the textbook) should be answered on separate sheets, which you must **staple** to this question sheet. Please write neatly.

(1) Suppose that going into a presidential debate in 2008, Republican candidate John McCain is thinking about whether or not to raise the "Bill Ayers issue." It is risky, because if it goes well then he will score political points, but there is also the possibility that he will be criticized for bringing up irrelevant issues and then his support might drop. Suppose that McCain calculates that the probability of this tactic succeeding is ½, in which case he will get a payoff of 3, and the probability of it failing is ½, in which case he gets a payoff of -4 (that is negative 4). If he doesn't bring up the issue, he neither gains nor loses and so his payoff is 0.

(a) (5 pts) Calculate McCain's **expected utility** for bringing up the "Bill Ayers issue."

(b) (2 pts) Is it rational for McCain to bring up the issue?

(c) (5 pts) Suppose the probability of it succeeding is p and the probability of it failing is 1-p. What is McCain's expected utility for bringing up the issue?

(d) (3 pts) How high does p have to be for it to be rational to raise the issue?

(2) Countries A and B are deciding how to divide $100 between them. If they can't reach an agreement, they go to war, in which case A wins with probability 4/5 and B wins with probability 1/5. If a country wins, it gets the entire $100, and it gets $0 if it loses. If they go to war, each country pays a cost of war of $15.

(a) (5 pts) What is country A's expected utility for war?

(b) (5 pts) What is country B's expected utility for war?

(c) (2 pts) Is there any peaceful division of the $100 that both sides would prefer to war? If so, list one of them.

(d) Now suppose that the leader of country A is facing domestic troubles and if he fights a war **and wins it**, he will get an additional $40 worth of benefits because his reelection will be guaranteed (this is like the "diversionary theory of war").
       (i) (5 pts) Recalculate A's expected utility for war under this new scenario, and
       (ii) (3 pts) re-answer question (c) under this new scenario.

(3) Consider the simultaneous-move game shown below, called "Hero":

2

		C	D
		C	**D**
1	C	1 , 1	3 , 4
	D	4 , 3	2 , 2

(a) (4 pts) Does either player have a strictly dominant strategy? If so, what?

(b) (6 pts) Find **all** of the pure-strategy Nash equilibria of the game (just mark them in the payoff matrix above).

(4) Consider the simultaneous-move game shown below, called "Bully":

2

		C	D
1	C	2 , 3	1 , 4
	D	4 , 2	3 , 1

(a) (4 pts) Does either player have a strictly dominant strategy? If so, what?

(b) (6 pts) Find **all** of the pure-strategy Nash equilibria of the game (just mark them in the payoff matrix above).

(5) Exercise U4 on p.128-129 (Chapter 4) of the textbook (4th edition of the textbook). (20 pts)

(6) Exercise U9 on p.130-131 (Chapter 4) of the textbook (4th edition of the textbook). (15 pts) [NOTE: In drawing the table for this game, be sure to list the actions in the same order that the textbook lists them (which is alphabetically).]

(7) Exercise U10 on p.131 (Chapter 4) of the textbook (4th edition of the textbook). (20 pts) [NOTE: In drawing the table for this game, be sure to designate the players in the way that part (a) indicates, that is, make Julie the Row player, etc. Also be sure to list the actions in the same order that the textbook lists them (black, lavender, and yellow). List them in this order for EACH player, and do not use any other order.]