Econ 327: Game Theory

Homework #2

University of Oregon

Due: Oct. 25^{th}

Question:	**Question 1**	**Question 2**	**Question 3**	**Question 4**	**Question 5**	Total
Points:	28	28	26	10	10	102
Score:						

For homework assignments:

- 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 _____

Question 1. Multiple Choice

(a) [4 points] Consider the strategic form game below:

		P_2		
		x	y	z
P_1	a	1,3	2,2	3,2
	b	2,2	2,2	4,3
	c	1,1	0,2	1,1

In the game above, which strategy is strictly dominated?

A. a
B. b
C. c
D. x

(b) [4 points] Perform Iterative Deletion of Strictly Dominated Strategies for the same game as above all the way to completion. What does IDSDS tell you about the Nash equilibrium of this game?

A. The NE is (a, x)
B. The NE is (a, y)
C. The NE is (Y, z)
D. IESDS by itself does not reveal the NE of this game.

(c) [4 points] Consider the strategic form game below:

		OD	
		Swerve	*Straight*
CD	*Swerve*	-1,-1	1,1
	Straight	1,1	-1,-1

What type of game is this?

A. A zero-sum game
B. A coordination game
C. An anti-coordination game
D. A prisoners' dilemma

(d) [4 points] Consider the strategic form game below:

		Navratilova	
		DL	CC
Evert	DL	50, 50	80, 20
	CC	90,10	20, 80

What is the *pure strategy* Nash equilibrium?

A. (DL, DL)
B. (CC, DL)
C. (DL, CC)
D. There are no Nash equilibria in pure strategies for this game.

(e) [4 points] Cosider the same game as above. Suppose that Navratilova plays DL with probability p and CC with probability $(1-p)$. What are Evert's expected payoffs?

A. $U_{Evret}(DL) = 30 - 80p$, $U_{Evret}(CC) = 70 - 20p$
B. $U_{Evret}(DL) = 80 - 30p$, $U_{Evret}(CC) = 20 + 70p$
C. $U_{Evret}(DL) = -60p$, $U_{Evret}(CC) = 100 + 100p$
D. $U_{Evret}(DL) = 90 - 40p$, $U_{Evret}(CC) = 20 + 60p$

(f) [4 points] The difference between a regular Nash equilibrium and a Subgame Perfect Nash equilibrium is that:

A. A Subgame Perfect Nash equilibrium assumes perfect information
B. Mixed strategies cannot be used in Subgame Perfect Nash equilibria
C. Subgame Perfect Nash equilibria assume that players won't fall for non-credible threats
D. There is no difference, they are the same

(g) [4 points] Which of the following are examples of *continuous* strategies?

A. Taylor Swift's choice of which cities to go on tour in
B. How much time Owen waits in line for Taylor Swift tickets
C. How much money TicketMaster charges for a ticket
D. Jose is at home and will only go if the stadium is less than 50% full
E. Both B and C are continuous strategies
F. None of the above are continous strategies

Question 2. Here's a little ditty, about Jack and Diane, two American kids growing up in the heartland. The game is below. [1]

		Diane		
		x	y	z
Jack	a	1,1	2,1	2,0
	b	2,3	0,2	2,1
	c	2,1	1,2	3,0

(a) [12 points] Find all pure Nash strategy profiles and outcomes if Jack and Diane move simultaneously. Carefully detail and explain the strategy profiles and how they map onto your Nash outcomes.

(b) [16 points] Find all pure Nash strategy profiles and outcomes *if Jack moves first*. Carefully detail and explain your strategy profiles and how they map onto your Nash outcomes.

[1] Cliff Bekar, Lewis and Clark College

Question 3. Consider the strategic form game below:

		P_2			
		A	B	C	D
P_1	H	10, 1	-3, 1	0, 1	3, 1
	J	16, -2	6, 6	1, -1	4, 0
	K	11, 1	0, 3	2, 2	10, 15
	L	13, 10	-1, 16	4, 12	5, 20

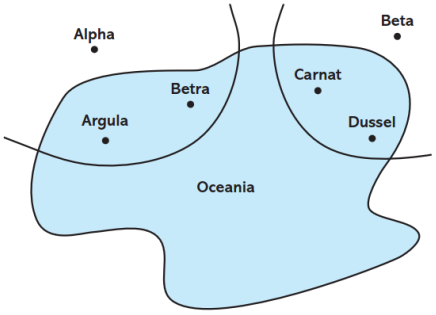
(a) [12 points] Use Iterated Deletion of Strictly Dominated Strategies and write out a simplified game table with any remaining cells.

(b) [8 points] Find all Nash equilibria in *pure strategies*.

(c) [6 points] Explain why you know that the strategies you found in part b are Nash equilibria.

Question 4. [10 points] The countries of Oceania and Eurasia are at war. As depicted in the figure, Oceania has four cities — Argula, Betra, Carnat, and Dussel — and it is concerned that one of them is to be bombed by Eurasia. The bombers could come from either base Alpha, which can reach the cities of Argula and Betra; or from base Beta, which can reach either Carnat or Dussel. Eurasia decides which one of these four cities to attack. Oceania doesn't know which one has been selected, but does observe the base from which the bombers are flying. After making that observation, Oceania decides which one (and only one) of its four cities to evacuate.

Assign a payoff of 2 to Oceania if it succeeds in evacuating the city that is to be bombed and a payoff of 1 otherwise. Assign Eurasia a payoff of 1 if the city it bombs was not evacuated and a zero payoff otherwise. Write down the extensive form game. [2]



[2]Harrington *Games, Strategies, and Decision Making*

Question 5. [10 points] A game theorist is walking down the street in his neighborhood and finds \$20. Just as he picks it up, two neighborhood kids, Jane and Tim, run up to him, asking if they can have it. Because game theorists are generous by nature, he says he's willing to let them have the \$20, but only according to the following procedure: Jane and Tim are each to submit a written request as to their share of the \$20. Let t denote the amount that Tim requests for himself and j be the amount that Jane requests for herself. Tim and Jane must choose j and t from the interval $[0, 20]$. If $j + t \leq 20$, then the two receive what they requested, and the remainder, $20 - j - t$, is split equally between them. If, however, $j + t > 20$, then they get nothing, and the game theorist keeps the \$20. Tim and Jane are the players in this game. Assume that each of them has a payoff equal to the amount of money that he or she receives. Find all Nash equilibria. [3]

[3]Harrington *Games, Strategies, and Decision Making*