Econ 327: Game Theory

Homework #2

University of Oregon

Due: Feb. 6^{th}

Question:	**Question 1**	**Question 2**	**Question 3**	**Question 4**	**Question 5**	Total
Points:	10	10	10	10	10	50
Score:						

For homework assignments:

- Complete *all* questions and parts. I will select one question at random to be graded according to the rubric on Canvas.
- 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. [10 points] **Multiple Choice**

(a) Consider the strategic form game below: In the game above, which strategy is strictly dominated?

		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

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

(b) 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) 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) Consider the strategic form game below:

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

Which method would you use to solve for Nash equilibria?

A. Graphing mixed strategies
B. Iterative deletion of strictly dominated strategies
C. Backwards induction
D. There are no Nash equilibria of this game.

(e) 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) 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) 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

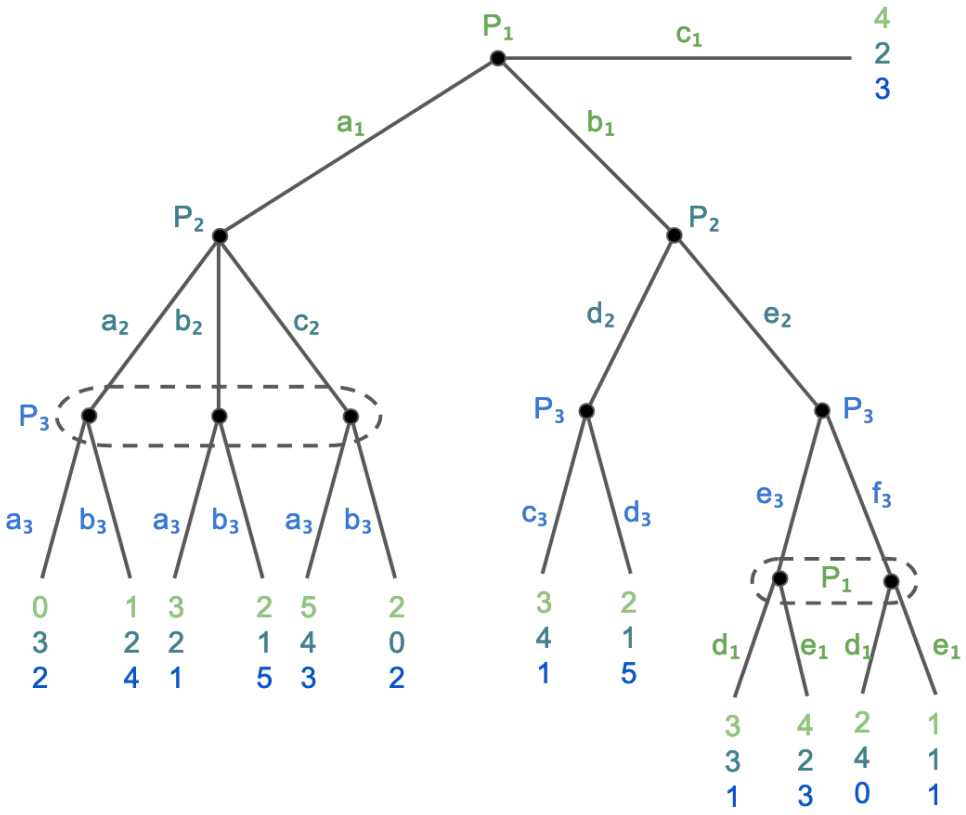
C. How much money TicketMaster charges for a ticket

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. Consider the extensive form game treee below.



(a) [1 point] What should a complete strategy profile look like?
How many elements will each player have in their *complete* strategy?

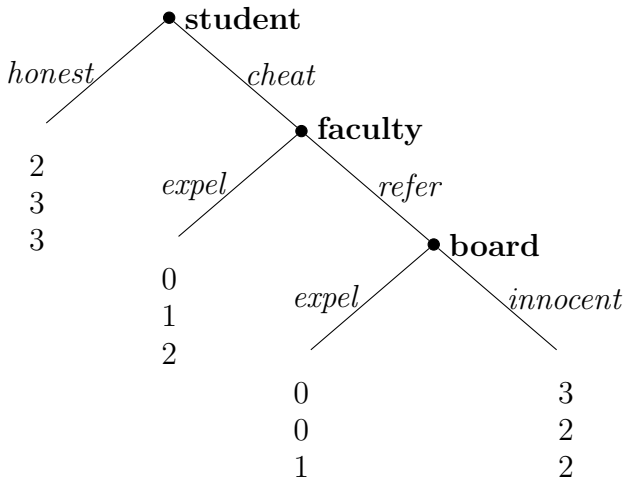
(b) [6 points] Find all subgame perfect Nash equilibria in pure strategies.

(c) [3 points] Can you find a Nash equilibrium that is not subgame perfect? Carefully explain.

Question 3. [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. [1]

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

Question 4. Consider a situation in which a student can decide to cheat or be honest on an exam. If the faculty thinks the student has cheated, the faculty member has to decide whether to expel them from the college or refer them to the Honor Board. The Honor Board has to decide whether to expel the student or find them innocent. The payoffs are ordered, student, faculty, and college. Assume the board shares the college's payoffs. [2]



(a) [2 points] Find the Subgame Perfect Nash Equilibrium.

(b) [6 points] Assume now that the board acts like *Nature*, making no deliberate choice but instead expels a guilty student q% of the time. Find All SGPN as a function of q.

(c) [2 points] Relative to the pure threat of explusion alone, who gains and who loses from the existence of an honor board that expels probabalistically?

[2] Cliff Bekar, Lewis and Clark College

Question 5. The players in the following game are *Bush* and *Saddam*. *Bush* suspects *Saddam* of having Weapons of Mass Destruction (WMD). Assume for the game that *Saddam* does have WMD. *Bush* can rely on *inspections* or *invade*. *Saddam* can *hide* his WMD or *destroy* them. [3]

		Bush	
		Invade	*Inspect*
Saddam	*Hide*	-2,2	3,0
	Destroy	-1,-3	0,1

(a) [4 points] Plot the expected values of each player's relevant strategies and find the mixed strategy Nash probabilities.

(b) [4 points] Plot each agent's Best Response Functions. Carefully:
   i. label your graph,
   ii. indicate all Nash equilibria,
   iii. and explain your answer

(c) [2 points] What is the probability Bush will invade only to find no WMD?

[3] Cliff Bekar, Lewis and Clark College