Econ 327: Game Theory
Practice Exam

University of Oregon

September 29, 2024

Version 1

Question:	Question 1	Question 2	Question 3	Total
Points:	20	40	40	100
Score:				

For Exams:

- Complete *all* questions and parts. All questions will be graded.

- Carefully explain all your answers on short and long answer questions.

  An incorrect answer with clear explanation will earn partial credit, an incorrect answer with no work will get zero points.

- If you do not understand what a question is asking for, ask for clarification.

Allowed Materials:

- A single 5" by 3" note card

- A non-programmable calculator

- Pencils, color pens, eraser, ruler/straight-edge etc.

Name _____

> Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page or another sheet of paper.

Question 1. [20 points] **Multiple Choice**

See the Quizizz from Tuesday for more practice.
They will look like the multiple choice questions from homework, but there will be 10 total instead of 5.

Long Answer

Question 2. Giustina and Neža can each either go to dinner at *Lion & Owl* or *Spice N Steam*. They both would prefer to go to a restaurant together than to go alone. Giustina prefers *Lion & Owl* to *Spice N Steam*, but Neža prefers *Spice N Steam* to *Lion & Owl*. Giustina is the more decisive of the two, so she chooses a restaurant first and then Než decides which restaurant she will go to after seeing where Giustina is going.

(a) [10 points] Draw an extensive form game to go with this story and solve for all subgame perfect Nash equilibria.

(b) [10 points] Now represent this game in strategic form and solve for all pure strategy Nash Equilibria. Can you find any Nash equilibria which are not subgame perfect?

Now suppose that if Giustina and Neža show up to *Lion & Owl* together, there is a chance that they will have to wait up to an hour to get a table. If they have to wait, Giustina would be equally happy going to *Spice N Steam* together where they wouldn't have to wait. Neža would be equally waiting to go to *Lion & Owl* with Giustina or *Spice N Steam*

(c) [10 points] Draw a new extensive form game to match the updated story. Make sure to define any variables you include.

(d) [10 points] Find all subgame perfect Nash equilibrium which results in both Giustina and Neža going to *Spice N Steam*.

Your answer should be a function of the probability of waiting in line at *Lion & Owl*.

Question 3. Consider the strategic form game below:

		P_2		
	A	B	C	D
W	15, -7	8, 2	18, -7	11, 5
X	-3, 18	6, -7	8, -7	17, 18
Y	9, 19	20, -4	13, 6	10, 16
Z	-9, 20	14, 16	15, -5	-3, 4

where P_1 labels the rows W, X, Y, Z.

(a) [8 points] Use Iterated Deletion of Strictly Dominated Strategies and write out a simplified game table with any remaining cells.

(b) [10 points] Find all Nash equilibria in *pure strategies*. Explain why you know they are Nash equilibria.

(c) [6 points] Define mixed strategies for each player using any pure strategies left after IDSDS. Make sure to define all variables you introduce.

(d) [8 points] Graph each player's expected utilities as functions of the other players' mixed strategy you defined in part (c).

(e) [8 points] Solve for all Mixed Strategy Nash equilibria in this game. A complete answer will include all calculations used and a graph of best response functions.

Short Answer

> These questions were cut for time on the actual midterm exam, but they are still good practice.
> Just don't count how much time you spend on them when you're gauging how long the real exam will take you.

(a) Consider the strategic form game below:

		Aslanbek		
		Low	*Moderate*	*High*
	Low	0,0	3,2	7,3
Hagano	*Moderate*	2,3	5,5	6,4
	High	3,7	4,6	4,5

Find all pure Nash strategy profiles.

(b) Akua, Barta, and Gilberta are playing a version of hide and seek. There are only two good hiding spots; up a tree, or behind a rock. Akua gets to hide first. Barta also hides, but she gets to see which spot Akua is hiding before she picks. Once Akua and Barta are hidden, Gilberta has to choose one and only one place to look. If there are two people hiding in the same spot, they crowd each other and Gilberta can see them. If there is only one person in a spot, Gilberta can't see who's hiding there.

Create an extensive form game tree and clearly specify Gilberta's information set.

(c) Suppose that two fishing boats are selling to the same market. Let V be the tons of fish caught by Vlatislav's boat, and J be the tons of fish caught by Jeren's boat. People in this town only want to buy so many fish, so the price P of fish is given by the inverse demand function:

$$P = 60 - (R + S)$$

Assuming both boat owners only care about profit, we get that Vlatislav's best response function is

$$V = 15 - \frac{J}{2}$$

and that Jeren's best response function is

$$J = 12 - \frac{V}{2}$$

Graph both players' best response functions and find all Nash Equilibria. Label your graph appropriately.