Intermediate Microeconomic Theory
ECN 100B, Fall 2019
Professor Brendan Price

Homework #4

Due: Saturday, November 2nd at 5:00pm

1 Static games (9 pts.)

For each of the following games:

- Circle all payoffs corresponding to a player's best response.
- Identify any/all strictly dominant strategies (or indicate that there are none).
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- Identify any/all pure strategy Nash equilibria by writing the equilibrium strategies as an ordered pair. (If there is no PSNE, write "no PSNE".)

a. (3 pts.) Two friends are deciding what costumes to wear for Halloween.

		Matt	
		Parrot	Zombie
Grace	Vampire	6, 1	10, 7
	Pirate	8, 4	10, 3

b. (3 pts.) It's the end of the soccer game, and it's time for a penalty shot.

		Goalie	
		Left	Right
Kicker	Left	0, 2	2, 0
	Right	2, 0	0, 2
	Oops	$-3, 1$	$-3, 1$

c. (3 pts.) Two doctors are deciding whether to order pizza for lunch.

		Dr. Blah	
		Whatevs	¯_(ツ)_/¯
Dr. Meh	Sure	2, 1	2, 1
	Okay	2, 1	2, 1

2 True or false (6 pts.)

Indicate whether each of the following statements is true or false. You do not need to provide an explanation this time—just true or false.

a. (1 pt.) Every static game has at least one pure strategy Nash equilibrium.

b. (1 pt.) If a strategy is weakly dominant, then it is a best response against any strategy chosen by the other player.

c. (1 pt.) In a dynamic game, it is always better to go first.

d. (1 pt.) Every pure strategy Nash equilibrium is also a dominant strategy solution.

e. (1 pt.) If a player has a strictly dominant strategy, then all of her other strategies must be strictly dominated.

f. (1 pt.) When deciding which action to take, each player tries to maximize the sum of the players' equilibrium payoffs.

3 Coordinated care (9 pts.)

California and Nevada are adopting electronic medical records (EMR) systems, provided by either Kareo or Praxis. Each state has a preference for using one of these systems rather than the other, but all else equal, both states would like to use the same system since doing so makes it easier to coordinate healthcare for people who commute across state lines.

		Nevada	
		Kareo	Praxis
California	Kareo	$6, 1$	$0, 0$
	Praxis	$0, 0$	$3, 5$

a. (1 pt.) What is California's best response against Nevada choosing Praxis?

b. (2 pts.) Identify any/all pure strategy Nash equilibria (in each case, list the strategies as an ordered pair). For each PSNE, also indicate the corresponding equilibrium payoffs.

c. (3 pts.) Suppose that California picks Kareo with probability $\frac{3}{4}$ and that Nevada picks Kareo with probability $\frac{1}{3}$. Show that this cannot be a mixed strategy Nash equilibrium. Which player is not playing a best response?

d. (3 pts.) Now imagine that California makes its decision first. California's decision will be public knowledge, so Nevada will get to see what California did before making its decision. Draw the game tree corresponding to this dynamic game. What will California do? How will Nevada respond? What are the equilibrium payoffs?

4 Bad intersection (6 pts.)

"You're a rotten driver," I protested. "Either you ought to be more careful or you oughtn't to drive at all."
"I am careful."
"No, you're not."
"Well, other people are," she said lightly.
"What's that got to do with it?"
"They'll keep out of my way," she insisted. "It takes two to make an accident."
—F. Scott Fitzgerald, The Great Gatsby

Two drivers, Jordan Baker and Nick Carraway, are approaching each other on a dark road. In the quotation above, Jordan is the "rotten driver".

		Nick	
		Wait	Turn
Jordan	Stop	$0, 0$	$1, 6$
	Slow	$2, 1$	$0, -1$
	Speed	$10, 0$	$-3, -7$

a. (1 pt.) Suppose this is a static game, where both players move at the same time. Circle all payoffs corresponding to best responses. Find any/all pure strategy Nash equilibria.

b. (3 pts.) Now suppose Jordan moves first, followed by Nick. (Her car is moving faster, so if she wants to brake, she has to react quickly.) Draw the game tree. Then use backward induction to find the subgame perfect Nash equilibrium. (Remember to say what each player chooses at every decision node.) What are the equilibrium payoffs?

c. (2 pt.) Now suppose that Nick moves first, followed by Jordan. Assuming that both players are rational, which action will Nick choose, and how will Jordan respond? Does this game exhibit first-mover advantage or second-mover advantage?