# Econ 327: Game Theory

## Practice Exam

University of Oregon

October 27, 2025

## Version 1

**For Exams:**

- Complete *all* questions and enumerate. 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.

# Multiple Choice

**Exercise 1.**
Rationality means that:

a) Players' preferences are continuous and independent
b) players always win over their opponents
c) players always act on perfect information
d) **players' preferences are complete and transitive**

**Exercise 2.**
Two player take turns emptying pebbles from a jar containing 100 pebbles total. Each player can take any number of pebbles between 1 and 5 on their turn. The player who takes the last pebble **wins** the game. How many pebbles should the first player take on their first turn?

a) 3
b) **4**
c) 2
d) 1
e) 5

**Exercise 3.**
If an outcome is _____, then it is _____

a) not a Nash equilibrium, not Pareto optimal
b) **never Pareto dominated, Pareto Optimal**
c) strictly dominated for everyone, Pareto optimal
d) Pareto dominated, a Nash equilibrium

**Exercise 4.**
Consider the strategic form game below:

| | | $P_2$ | | |
|---|---|---|---|---|
| | | $x$ | $y$ | $z$ |
| $P_1$ | $a$ | 2,0 | 6,3 | 4,2 |
| | $b$ | 2,5 | 8,9 | 2,2 |
| | $c$ | 1,4 | 5,3 | 5,1 |

In the game above, which strategy is strictly dominated?

a) y
b) **z**
c) b
d) x
e) a

**Exercise 5.**
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 (b,y)**
d) IESDS by itself does not reveal the NE of this game.
e) The NE is (Y, z)

**Exercise 6.**
A choice that is the best for a player **no matter what everyone else is doing** is referred to as a:

a) strictly dominated strategy
b) confidence strategy
c) Pareto optimal strategy
d) **strictly dominant strategy**

**Exercise 7.**
Consider the strategic form game below:

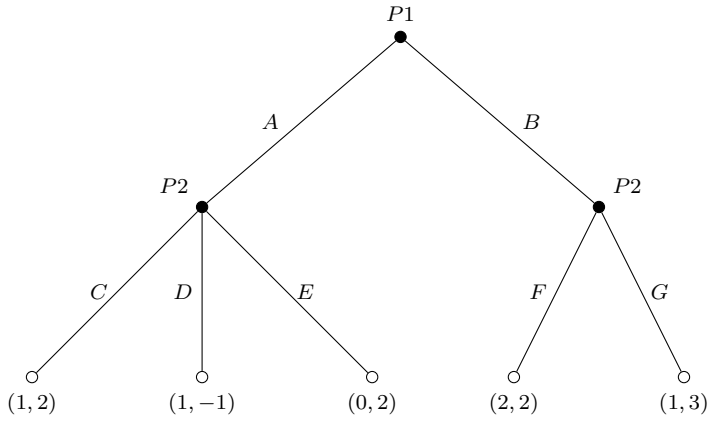
| | | $P_2$ | | |
|---|---|---|---|---|
| | | Left | Middle | Right |
| $P_1$ | Up | 0,1 | 9,0 | 2,3 |
| | Straight | 5,9 | 7,3 | 1,7 |
| | Down | 7,5 | 10,10 | 3,5 |

What is the Nash Equilibrium?

a) Up, Middle
b) Straight, Right
c) **Down, Middle**
d) Down, Right

**Exercise 8.**
Consider the extensive form game below:
Which of the following is a subgame-perfect Nash equilibrium?

a) (A, EF)
b) **(B, CG)**
c) (B, CF)
d) (B, DG)




**Exercise 9.**
In a **sequential-move game**, the appropriate method of analysis is:

a) Nash equilibrium in mixed strategies
b) best response dynamics
c) **backward induction (rollback analysis)**

**Exercise 10.**
In the **Prisoner's Dilemma**, mutual cooperation:

a) **Pareto dominates the outcome of mutual defection**
b) is stable
c) is a credible threat
d) is a dominant strategy equilibrium

| See the Canvas quizzes for more practice. |
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# Long Answer

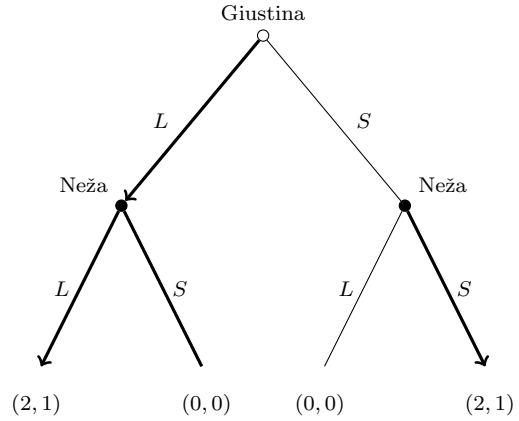
**Exercise 11.**
Giustina and Neža can each either go to dinner at *Lion & Owl* or *Spice N Steam*. They both would prefer to go to a restaurant together than to go alone. Giustina prefers *Lion & Owl* to *Spice N Steam*, but Neža prefers *Spice N Steam* to *Lion & Owl*. Giustina is the more decisive 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) Draw an extensive form game to go with this story and solve for all subgame perfect Nash equilibria.

b) 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?

**SolutionSolution 11.11.**

a) Extensive form w/ arrows representing sub-game rational actions:




SPNE: $\{(L)_G, (L \text{ if L}, S \text{ if S})_N\}$

b) Normal form w/ underlined BR payoffs:

| | | Neža | | | |
|---|---|---|---|---|---|
| | | $L, L$ | $L, S$ | $S, L$ | $S, S$ |
| Giustina | $L$ | $\underline{2}$, $\underline{1}$ | $\underline{2}$, $\underline{1}$ | 0, 0 | 0, 0 |
| | $S$ | 0, 0 | 1, $\underline{2}$ | 0, 0 | $\underline{1}$, $\underline{2}$ |

$\{(L)_G, (L \text{ if L}, L \text{ if S})_N\}$ is an NE but not SPNE because Neža would be irrational to pick Lion and Owl in the off-equilibrium path after Giustina goes to Spice N Steam.
$\{(S)_G, (S \text{ if L}, S \text{ if S})_N\}$ is another NE that is not sub-game perfect because Neža would be irrational to pick Spice N Steam in the off-equilibrium path after Giustina goes to Lion and Owl.

**Exercise 12.**
Consider the strategic form game below:

| | | $P_2$ | | | |
|---|---|---|---|---|---|
| | | $A$ | $B$ | $C$ | $D$ |
| $P_1$ | $W$ | 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 |

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

b) Find all Nash equilibria in *pure strategies*. Explain why you know they are Nash equilibria.

**SolutionSolution 12.12.**

a)

1. $C$ strictly dominated by $A$
2. $Z$ is now SD by $Y$
3. $B$ is now SD by $A$
4. $Y$ is now SD by $W$
5. no more SD strats, so stop IDSDS

| | | $P_2$ | |
|---|---|---|---|
| | | $A$ | $D$ |
| $P_1$ | $W$ | $\underline{15}$, -7 | 11, $\underline{5}$ |
| | $X$ | -3, $\underline{18}$ | $\underline{17}$, $\underline{18}$ |

b) NE: $\{X, D\}$
$X$ is BR to $D$, so $P_1$ has no regrets.
$D$ is BR to $X$, so $P_2$ has no regrets.
neither has any incentive to unilaterally deviate their own strategy.

**Exercise 13.**
Consider the strategic form game below:

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

a) Find all pure Nash strategy profiles when both play *simultaneously*.

b) Find all pure Nash strategy profiles when *Hagano goes first*. Carefully explain all strategy profiles.

**SolutionSolution 13.13.**

a) There are three simultaneous pure strategy NE: $\{H_h, L_a\}$, $\{M_h, M_a\}$, and $\{L_h, H_a\}$

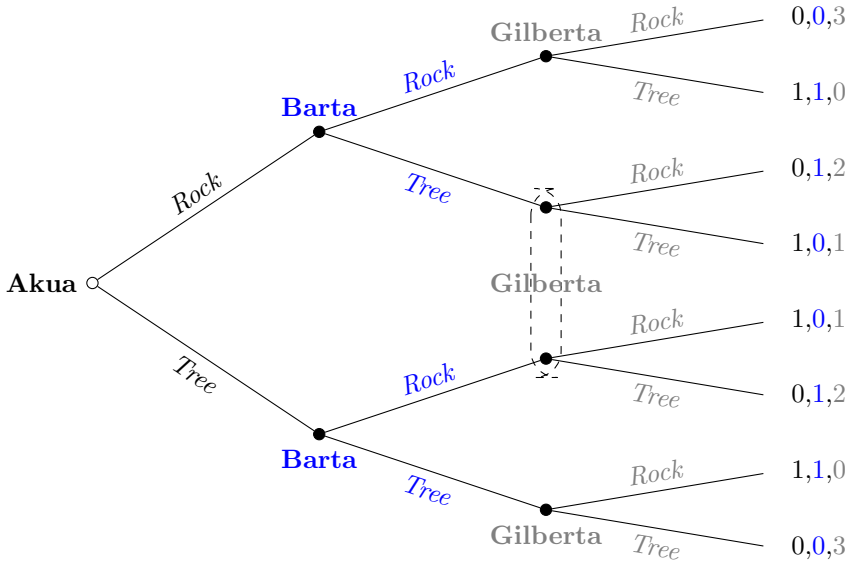
b) There is only one SPNE when Hagano goes first:
- Hagano plays *Low*
- Aslanbeck plays:
  - *High* if Hagano plays *High*
  - *Moderate* if Hagano plays *Moderate*
  - *Low* if Hagano plays *Low*

**Exercise 14.**

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.

**SolutionSolution 14.14.**




Gilberta's information set:

- Either both players are behind the Tree,
- or both players are behind the Rock,
- or: either Akua is behind the Rock and Bartua is behind the Tree; or Akua is behind the Tree and Bartua is behind the Rock (represented on the tree by the circled nodes)

**Exercise 15.**

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:

$$P = 60 - (V + J)$$

Assume that Vlatislav has a marginal cost of 30 and Jeren has a marginal cost of 36.

a) Solve for Vlatislav's best response rule as a function of $J$.

b) Solve for Jeren's best response rule as a function of $K$.

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

**SolutionSolution 15.15.**

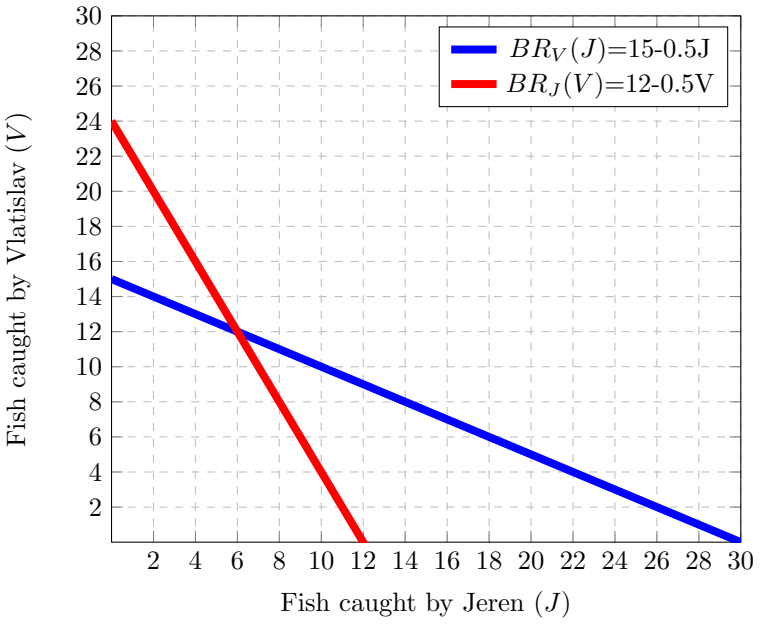
a)

$$\begin{aligned} \Pi_v &= (60 - V - J)V - 30V \\ &= 60V - V^2 - VJ - 30V \\ \frac{d\Pi_v}{dV} &= 60 - 2V - J - 30 \\ BR_V(J) &= \frac{60 - 30 - J}{2} = 15 - \frac{J}{2} \end{aligned}$$

b)

$$\begin{aligned} \Pi_j &= (60 - V - J)J - 36J \\ \frac{d\Pi_j}{dJ} &= 60 - 2J - V - 36 \\ BR_V(J) &= \frac{60 - 36 - V}{2} = 12 - \frac{V}{2} \end{aligned}$$

c)




NE: $(J = 6, J = 12)$ is the only strategy profile where both players' best responses intersect.