

Game Theory: In-class Quiz 4

Fall 2024

Student ID:

Name:

Instructions

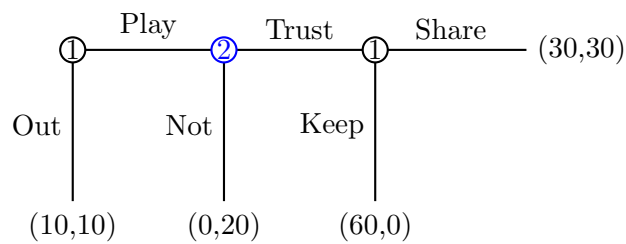
1. Do NOT flip over this page until every student received this quiz. Your TA will let you know when you can start.
2. During this closed-book quiz, you cannot consult any materials.
3. If you are unable to explain your reasoning in English, it is okay to write in Korean.
4. Should you need more spaces, use the backside of the page, with clearly indicating the relevant quiz number.

Honor Code: Cheating on exams or quizzes, plagiarizing someone else's answers as one's own, or any other instance of academic dishonesty violates the standards of academic integrity.

Confidentiality Code: Sharing the information of the exam or quiz contents with other students in any form and medium is strongly prohibited, as it raises information inequity.

I, _____, consent to the Honor Code and the Confidentiality Code.
(write your name)

1. Consider the following trust game:



- (a) Suppose this game is played once. Represent the game in a normal form, and find all pure-strategy Nash equilibria. [Hint: There are two.]
- (b) Suppose the game is repeated indefinitely. Both players discount future payoffs by $\delta \in [0, 1]$. Under what range of δ , $\{(\text{Play}, \text{Share}), \text{Trust}\}$ is sustainable as a subgame perfect equilibrium by a grim-trigger strategy? Here the grim-trigger strategy is P1 playing (Out, Keep) and P2 playing (Not) forever after observing a deviation from $\{(\text{Play}, \text{Share}), \text{Trust}\}$.

2. Consider the Battle of Sexes with incomplete information: Player 2(P2) is either a “Meet”(M) type or an “Avoid”(A) type.

- M-type P2 wishes to meet P1 at the concert playing Bach.
- A-type P2 wishes to avoid meeting at the concert playing Bach.
- P2 is type M with probability p and type A with probability $1 - p$.
- P2 knows her type. P1 only knows the prior probability distribution of P2’s type.

They simultaneously choose Bach(B) or Stravinsky(S). Payoffs are shown in the matrices below.

P1 \ M-type P2	B	S	P1 \ A-type P2	B	S
B	3,2	0,0	B	2,0	0,2
S	0,1	1,0	S	0,1	2,3

Find a range of p such that (B; B, S) is a pure strategy Bayesian equilibrium. (The strategy is described in the form of (P1’s strategy; M-type P2’s strategy, A-type P2’s strategy).)

3. Consider the Cournot competition with incomplete information. The inverse market demand is given as $P = 24 - q_1 - q_2$. It is commonly known that firm 1's production cost is zero. Firm 2's marginal production cost is either 4 (type L) or 8 (type H) with equal probability of $1/2$. Denote type-L firm 2's production quantity by q_2^L , and type-H firm 2's quantity by q_2^H .

- (a) Find firm 2's type-dependent best responses to q_1 .
- (b) Find firm 1's best response to maximize the expected profit.
- (c) Find the Bayesian Nash equilibrium of this game.