Advanced Foundations of Game Theory

Game Theory · Practice Test · 12 Questions

1. In the context of the Nash Equilibrium, what condition must be satisfied for a strategy profile to be considered a pure strategy equilibrium?

A) Every player minimizes their expected cost regardless of opponents
B) No player can unilaterally deviate to increase their payoff
C) All players must choose a randomized strategy with equal probability
D) The sum of all players' payoffs must equal zero

2. Which theorem states that every finite game with perfect information has a pure strategy Nash equilibrium that can be found by backward induction?

A) Zermelo's Theorem
B) Brouwer Fixed-Point Theorem
C) Kuhn's Theorem
D) Folk Theorem

3. What does the 'Folk Theorem' in repeated games assert regarding the subgame perfect equilibrium outcomes?

A) Cooperation is impossible in games with finite horizons
B) Equilibria are only possible if the discount factor is zero
C) Any feasible, individually rational payoff can be sustained as an equilibrium with a sufficiently high discount factor
D) All equilibria must involve tit-for-tat strategies

4. In cooperative game theory, what property must a solution satisfy if it is to be considered within the 'Core' of a game?

A) It must be computed using a Shapley value
B) It must ensure that no coalition can improve its members' payoffs by acting independently
C) It must be unique and symmetric
D) It must allow for side payments in all sub-games

5. The Shapley value in cooperative game theory assigns a unique distribution of total surplus among players based on which mathematical concept?

A) Maximum Likelihood Estimation
B) Average marginal contribution across all possible permutations
C) Minimax regret criteria
D) Dynamic programming recursion

6. Which theorem guarantees the existence of a Nash equilibrium in any finite game, provided mixed strategies are allowed?

A) Kakutani Fixed-Point Theorem
B) Arrow's Impossibility Theorem
C) Bolzano-Weierstrass Theorem
D) Nash's Existence Theorem

7. In signaling games, what defines a 'Separating Equilibrium'?

A) All types of senders choose the same message
B) Different types of senders choose different messages
C) The receiver ignores all signals provided by the sender
D) The payoffs are zero for both sender and receiver

8. What is the defining characteristic of a 'Global Game' as introduced by Carlsson and van Damme?

A) Perfect information with no uncertainty
B) Strategic interaction under incomplete information about payoffs
C) A game played by more than 100 participants
D) Equilibrium selection through irrational agents

9. The 'Revelation Principle' in mechanism design states that any equilibrium outcome of a mechanism can be replicated by an equilibrium of which type of mechanism?

A) Direct-revelation mechanism
B) Iterative bidding mechanism
C) Stochastic auction mechanism
D) Bayesian-Nash mechanism

10. What is the primary function of the 'Trembling Hand Perfect Equilibrium' refinement?

A) To eliminate non-credible threats by accounting for the possibility of small implementation errors
B) To calculate the maximum possible payoff in an infinite game
C) To ensure that all players move simultaneously
D) To enforce collusion among all players

11. In the context of evolutionary game theory, what is an Evolutionarily Stable Strategy (ESS)?

A) A strategy that is immune to invasion by any mutant strategy
B) A strategy that changes constantly over time
C) A strategy that always results in a tie
D) A strategy that requires human cognitive intervention

12. What does the 'Price of Anarchy' quantify in a game-theoretic model?

A) The total number of players in a system
B) The efficiency loss caused by selfish behavior compared to a social optimum
C) The transaction costs associated with forming a cartel
D) The inflation rate in a barter economy