Foundations of Game Theory

Mathematics And Economics · Practice Test · 20 Questions

1. In game theory, what term describes a situation where no player can benefit by changing their strategy while the other players keep theirs unchanged?

A) Zero-sum equilibrium
B) Nash equilibrium
C) Pareto efficiency
D) Dominant strategy

2. Which mathematician is credited with formalising the concept of the Nash equilibrium?

A) John von Neumann
B) Oskar Morgenstern
C) John Nash
D) Albert Tucker

3. What defines a 'zero-sum game'?

A) One player wins exactly what the other player loses
B) All players end with a net gain of zero
C) No player can win or lose
D) The game ends in a draw

4. In the classic 'Prisoner's Dilemma', what is the result if both players choose to defect?

A) Both receive the best possible outcome
B) Both receive a worse outcome than if they had both cooperated
C) One player goes free and the other stays in prison
D) The game is reset

5. What is a 'dominant strategy' in a game?

A) A strategy that is only chosen by the strongest player
B) A strategy that provides the best outcome regardless of the opponent's choice
C) A strategy that requires a random selection
D) A strategy that leads to a draw

6. Which field of study focuses on the study of mathematical models of strategic interaction among rational decision-makers?

A) Game Theory
B) Statistics
C) Calculus
D) Geometry

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7. In game theory, what is a 'payoff matrix' used for?

A) To list the historical winners of the game
B) To calculate the probability of a random event
C) To represent the outcomes of a game for each combination of strategies
D) To determine the rules of the game

8. What is a 'cooperative game' characterized by?

A) Players can form binding agreements or coalitions
B) Players never communicate
C) Players are prohibited from sharing information
D) The game must end in a tie

9. In game theory, what does 'utility' typically represent?

A) The physical resources used in the game
B) The level of satisfaction or value a player derives from an outcome
C) The total number of moves made
D) The difficulty level of the game

10. What is the 'Minimax' theorem primarily used for in game theory?

A) Maximizing the potential loss
B) Minimizing the maximum possible loss in zero-sum games
C) Ensuring both players win
D) Selecting the starting player

11. Which of these is a classic example of a 'non-zero-sum' game?

A) The Prisoner's Dilemma
B) A standard chess match
C) A game of poker
D) Rock-paper-scissors

12. What does 'perfect information' mean in a game?

A) Every player is a grandmaster
B) All players know every move that has previously occurred
C) The game has no rules
D) The game is impossible to lose

13. In game theory, what is a 'mixed strategy'?

A) A strategy that combines luck and skill
B) A player chooses between several moves randomly with specific probabilities
C) A player consults with the opponent before moving
D) A player ignores the rules of the game

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14. What defines a 'sequential game'?

A) Players move at the exact same time
B) Players make decisions in a specific order
C) The game can be finished in one move
D) Players are unaware of the turn order

15. What is 'Pareto efficiency'?

A) A state where one player's situation cannot be improved without worsening another's
B) A state where everyone wins
C) A state where the game ends immediately
D) A state where all players receive equal payoffs

16. What is the significance of the 'Centipede game' in game theory?

A) It demonstrates that rational players may fail to cooperate even when it is mutually beneficial
B) It is the only game with infinite moves
C) It proves that cooperation always leads to a win
D) It is a game played only with physical insects

17. In a 'normal form' game, how are the players' moves typically represented?

A) As a tree diagram
B) As a matrix
C) As a list of instructions
D) As a series of equations

18. What is the 'Backwards Induction' method used for?

A) Predicting future moves in sequential games by reasoning from the end
B) Randomly selecting a starting move
C) Ignoring previous moves
D) Analyzing games with no end

19. What is a 'zero-sum' game outcome where no one gains an advantage called?

A) Equilibrium
B) Stalemate
C) Symmetry
D) Independence

20. Who co-authored 'Theory of Games and Economic Behavior' with John von Neumann?

A) John Nash
B) Oskar Morgenstern
C) Adam Smith
D) Alfred Marshall

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