Game Theory

Game A: The Prisoner's Dilemma Game

One classic type of game is the prisoner's dilemma game. Prisoner's Dilemma games are games in which each player has a dominant strategy; and when both players play the dominant strategy, the payoffs are smaller than if each player played the dominant strategy and the other didn't. The dilemma is how to avoid this bad outcome.

The basics of the prisoner's dilemma game are as follows: Two prisoners have the option to confess or not to confess to a crime they committed. The prosecutor has only enough information to convict both criminals of a minor offense and is, therefore, relying on a confession. The minor offense carries one year in jail. The prisoners are questioned in different cells, without the ability to communicate. They are told that if one prisoner confesses while they other remains silent, the prisoner confessing will go free and the prisoner remaining silent will serve 20 years in jail. If both prisoners confess, both prisoners will serve three years in jail.

If a player goes free, the payoff is 0. If a player serves one year in jail, the payoff is 1. If a player spends 20 years in jail, the payoff is 20. Use these numbers to create a payoff matrix below.

1. Determine these three basic elements of the game
    a. The Players:

    b. The strategies for each player:

    c. The payoffs for each player:

2. Create a payoff matrix for the prisoner's dilemma game.

3. Identify any dominant strategies for each player.

4. Find the Nash Equilibrium

Game B: Variation of the Prisoner's Dilemma Game

You are in a class with one other student. It is the end of the semester, and final exams are in a week. Your teacher has said the final exam will be graded so that anyone who scores the class average on the final exam will receive a "B" in the class. Anyone who scores above the average will receive an "A" in the class, and anyone who scores below the average will fail the class. You would certainly score higher on the exam than the other student. You and the other student have made an agreement not to take the final exam so that the class average is zero and you both receive "B" grades.

1. Determine the three basic elements of the game
    a. The players:

    b. The strategies for each player

    c. The payoffs for each player

2. Create a payoff matrix for this game.