GAMES

In each game, there are two players who take turns making moves, and a player cannot decline to make a move. The problem is the same in each game: find out which player (the first or the second) has a winning strategy.

1. The number 1 through 20 are written in a row. Two players take turns putting plus signs and minus signs betweens the numbers. When all such signs have been placed, the resulting expression is evaluated (i.e. the additions and subtractions are performed). The first player wins if the result is even, the second player wins if it is odd. Who will win and how?

2. There are two piles of 7 stones each. At each turn, a player may take as many stones as she/he chooses, but only from one of the piles. The loser is the player who cannot move (that is, the player who can't take any stones because there aren't any left.)

3. Two players take turns putting pennies on a round table, without piling one penny on top of another. The player who cannot place a penny loses.