2004 Winter Camp

Games!

1. *Bachet's Game.* There are n checkers on a table. Each player can pick up any number of checkers up to $k < n$. The winner is the person who takes the last checker. For which n does the first player win?

2. *Variation 1.* Each player can pick up an arbitrarily large number of checkers provided that the number picked up is a power of 2.

3. *Variation 2.* Each player can pick up one checker or a prime number of checkers.

4. Two players alternately colour squares of a 4×4 chessboard. The loser is the first who completes a coloured 2×2 square. Who can force a win?

5. A knight is placed on a chessboard by the first player. The second player makes a legal chess move. Players alternate moving the knight freely except for the restriction that the knight cannot move to a square visited before. The player who cannot move loses.

6. Two players alternately write positive integers $\leq n$ on the blackboard. Writing divisors of numbers that are already written is not allowed. The one who cannot move any more loses. Who wins?

7. *Open poker.* An ordinary deck of 52 cards is used. The cards are plced face up on a table. The first player choses any 5 cards. The second player then selects 5 cards from those remaining. The first player may then throw away 0 to 5 cards from his hand and replace them with any of the remaining 42 cards. The second player may do the same after that from the remaining 37 cards. (He may not take the first player's discards.) The better hand wins. If the hands are of equal strength the second player wins. In this game, the four suits have equal rank.

8. In the game FISH SOUP, there are nine cards placed on a table face up. These cards each have a four letter word: FISH, SOUP, HORN, KNIT, VOTE, ARMY, CHAT, GIRL, SWAN. Players take turn choosing a card. The winner is the person who first collects three cards with a letter that is common to all three. You play against an opponent who goes first. She chooses KNIT. Prove that you have only one reply that does not lose.

9. A king is placed on the lower left corner of an 8×8 chessboard. Players take turns moving the king upwards, to the right, or diagonally upwards to the right. The one who places the king on the upper right corner is the winner. Who wins?