

Name: _____

Pid: _____

1. (50 points) Check all the correct statements.

- The Nim position $(6, 5, 7)$ is an N-position.
- In the subtraction game where players may subtract 2 and 3 chips on their turn 5 is an N-position.
- The binary representation of 38 is 100100.
- Bitwise XOR of 100111 and 111111 is 011000.
- Nim-sum of 14 and 21 is 27.

2. (10 points) Two players one by one put bishops on the chessboard such that none of them attack each other. Determine the winning strategy.

Use symmetric strategies.

3. (10 points) Consider the Misère subtraction game where players may subtract 1, 2 or 5 chips on their turn, identify the N and P positions.

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4. (10 points) Two players play the following game: on each step they move a rook up or to the right (on any number of squares); the rook begins on a1.
Determine who wins in this combinatorial game.