THE NIM GAME

Course: Algorithmic Problem Solving

Course Code: 17ECSE309

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Normal Play

- Two Absolutes:
  - 1. A player cannot move from a winning position back to a winning position (Nim Sum = 0)
  - 2. Every losing position (Nim Sum > 0) has an allowable move to a winning position.
- Thus the winning strategy is to continue making moves converting losing positions to winning positions until the ultimate winning position is achieved (No more objects on the table).

- Of course, this assumes the other player does not know the winning strategy as well.
- If both players know the winning strategy and play without error, then the winner can be determined by the starting position of the game.
- If the game starts in a losing position, then the first player to move will ultimately win.
- If the game starts in winning position, then the second player to move will ultimately win.
- The player who removes the last object loses!
- Therefore, the goal is to leave the last object for your opponent to take
- Winning Strategy:
  - Play exactly like you would in normal play until your opponent leaves one pile of size greater than one.
  - At this point, reduce this pile to size 1 or 0, whichever leaves an odd number of piles with only one object.

Misere Nim

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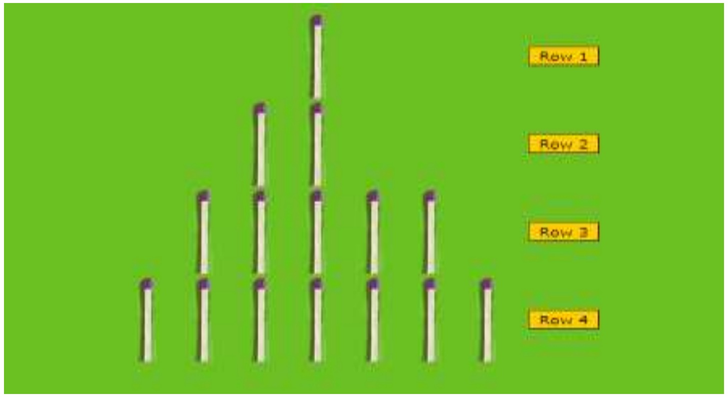
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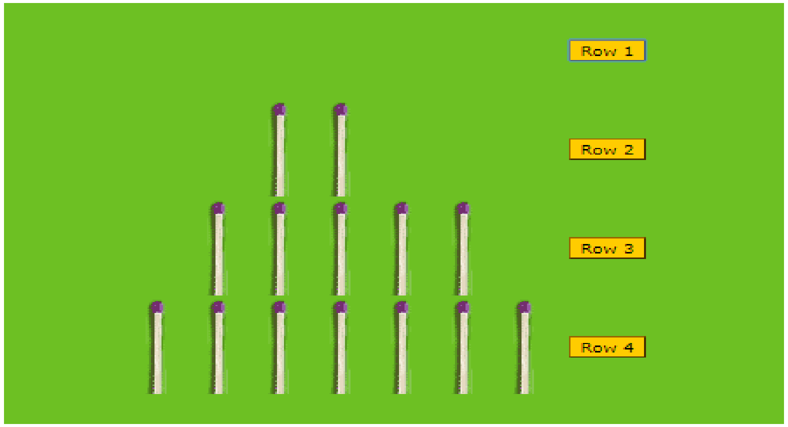
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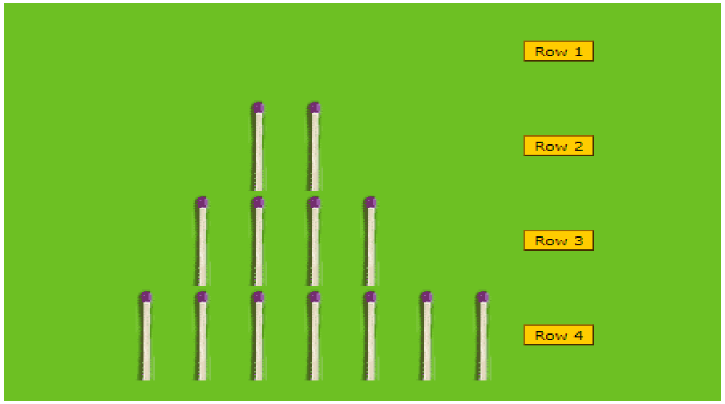
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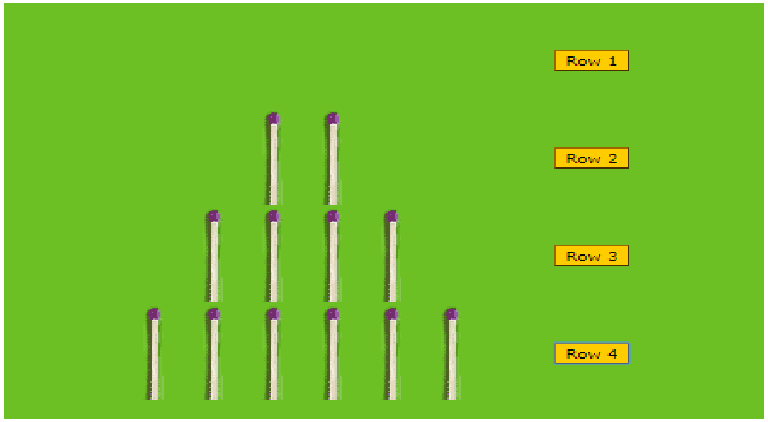
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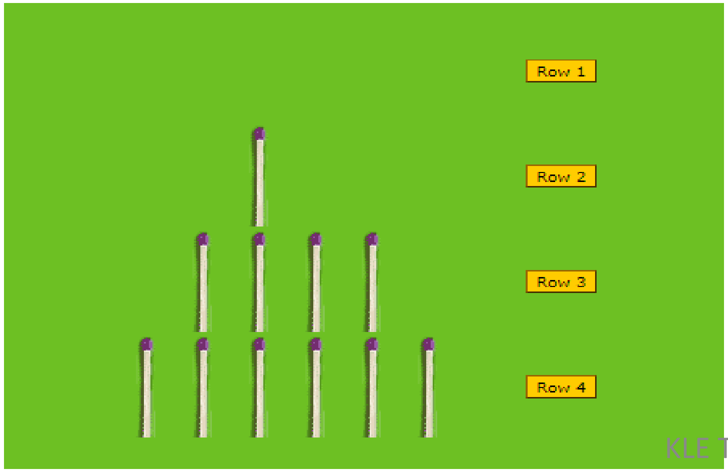
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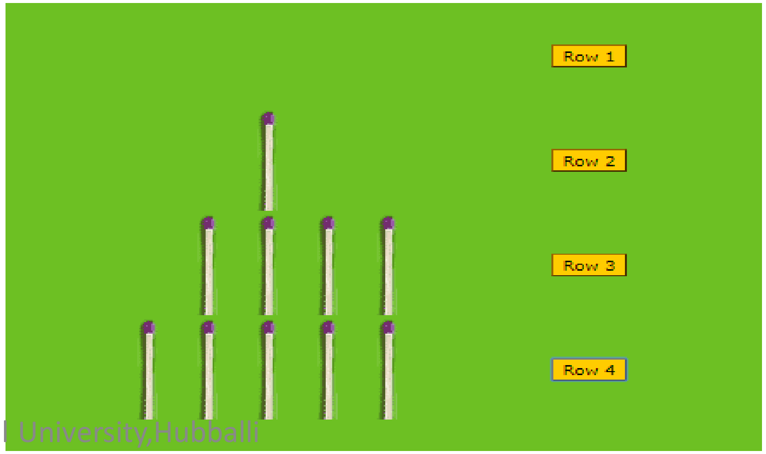
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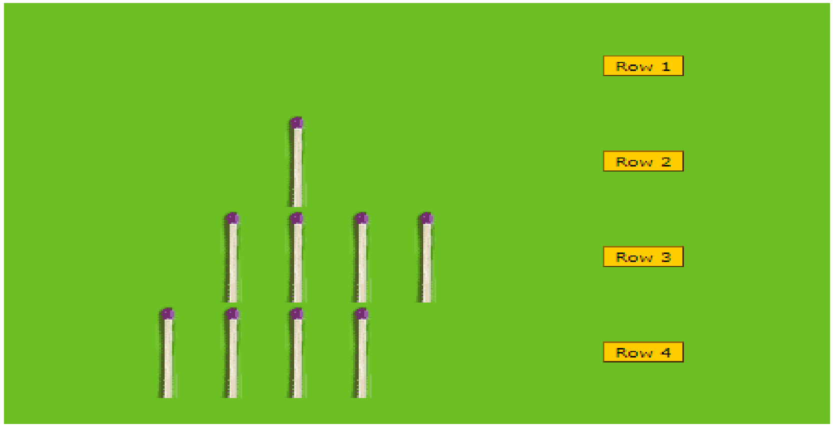
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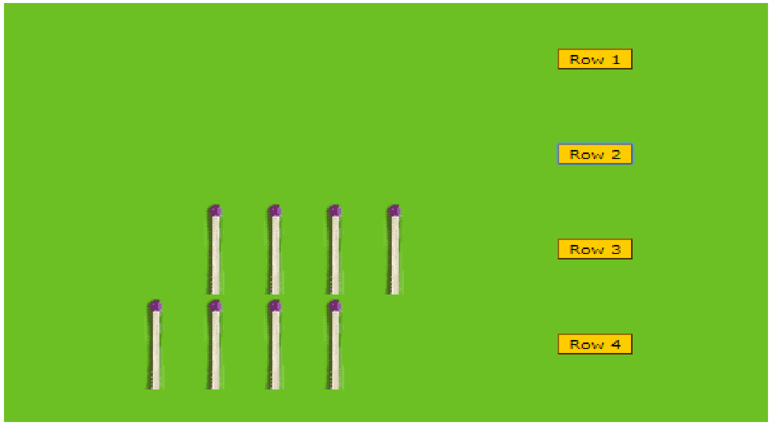
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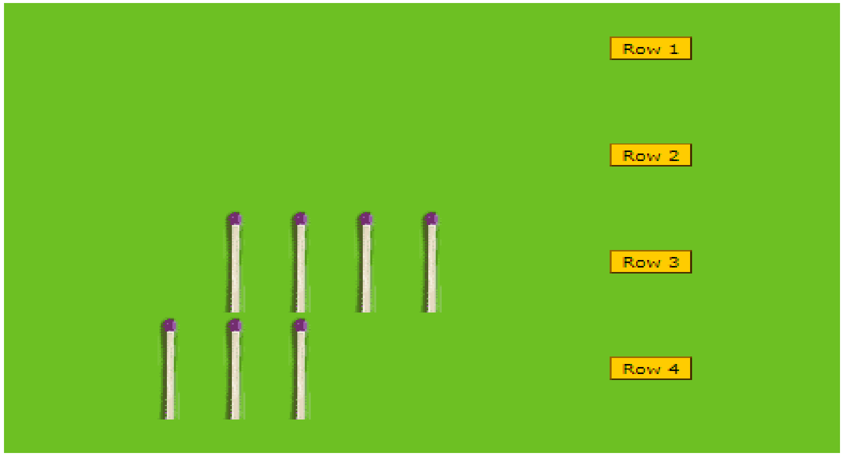
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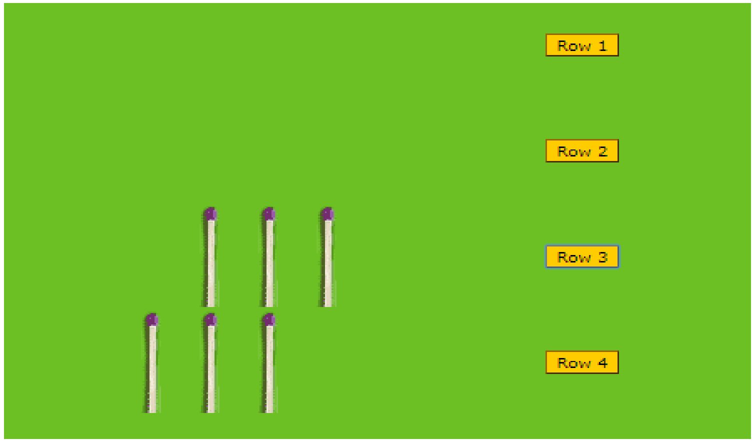
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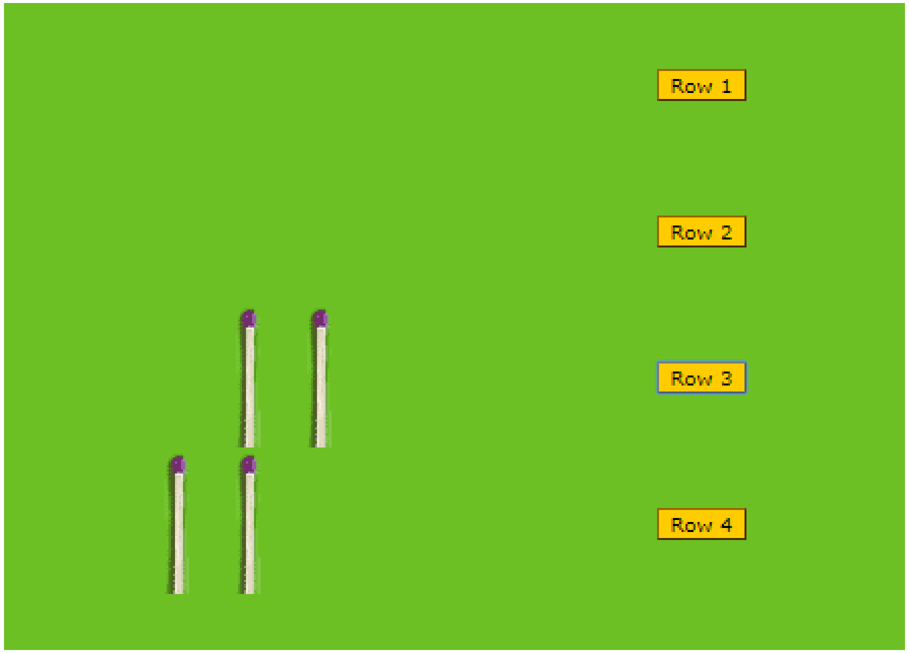
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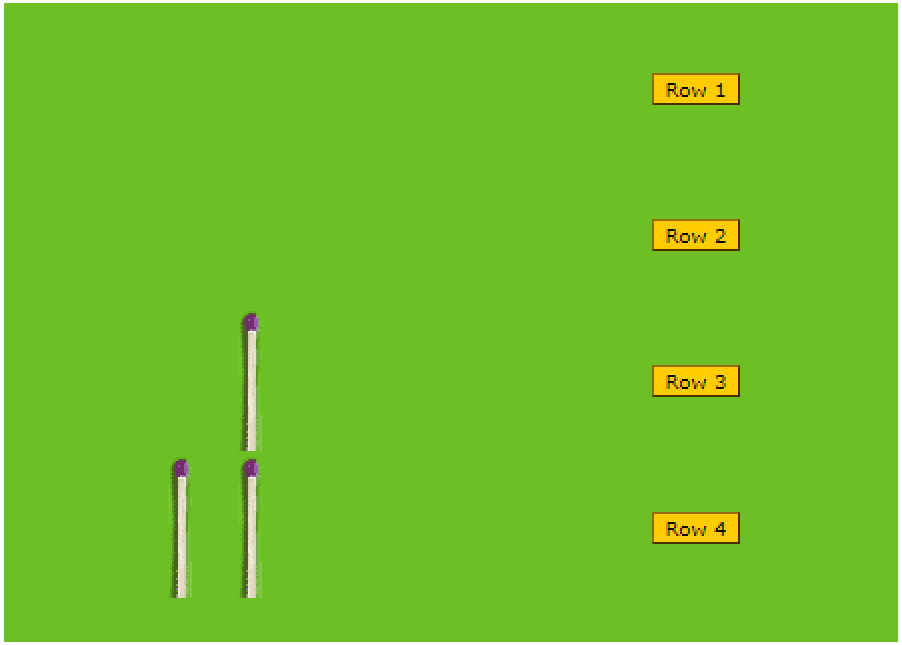
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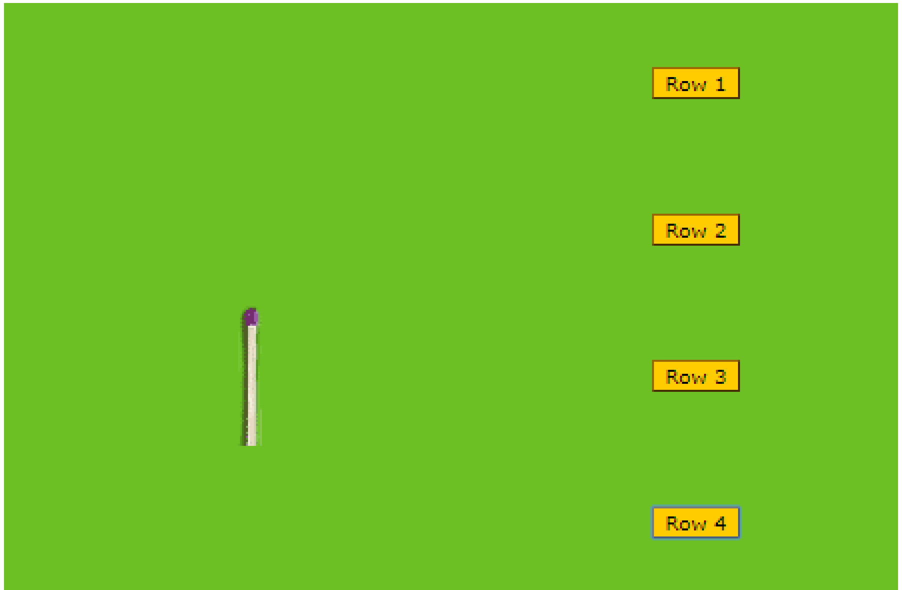
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References

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