Games Special-Session
SIGCSE-03

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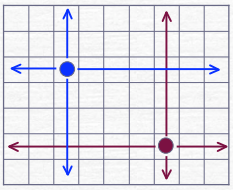
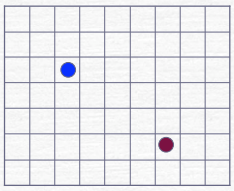
Laser War



Matrix M×N, Robots – Red, Blue
Each move - horizontal / vertical
Fire-lines - horizontal & vertical
Crossing of fire-line – game ends

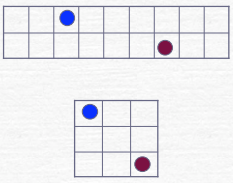
Laser War



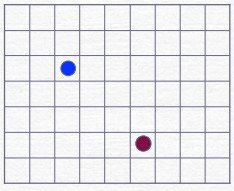
1. Backtracking through all the possible game scenarios
2. Dynamic Programming – up to (M-1)×(N-1) different-size rectangles between the robots

Laser War

Look for a playing strategy, by simplification

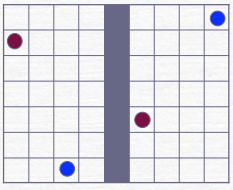


Laser War



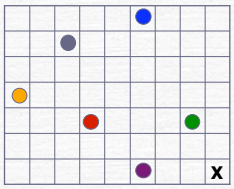
Invariant property:
Horiz-distance = Vert-distance

Laser War



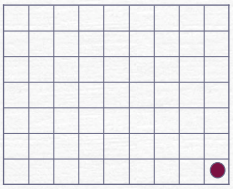
Two rooms, concurrently

Wyt Rooks



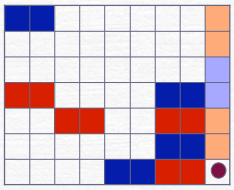
Each player chooses a rook and moves it any number of vertical xor horizontal spaces toward the X. Last to move wins (normal form).

Pawn on a Board



Each player moves the pawn, horizontally or vertically, to an adjacent square, which was not-yet-visited. Last to move wins (normal form).

Pawn on a Board



Invariant

+ Auxiliary coloring

Multiple by 2..9

Starting at N=1, two players multiply N by one of the integers 2,3,…,9, in alternating turns. Free choice of one of these integers in each turn.

The first to cross 1000 wins.

Example:

1 □ 5 □ 45 □ 90 □ 270 □

Multiple by 2..9

Backward reasoning:

1000+

112 – 999

56 – 111

7 – 55

4 – 6

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Application in Class

Motivate, Illustrate, Exercise:

- Invariance
- Design techniques, recursion
- Auxiliary elements
- Lookup table, pre-processing
- Mathematical patterns
- Problem solving heuristics