Rules for Strategic Games

January 2, 2025

Introduction

This document provides an overview of the rules for the games selected for the course project. If you have a different game in mind, approach me in class.

Contents

1   Snort

Snort is an abstract strategy game that challenges players to dominate a board by strategically placing their markers while blocking their opponent's moves. The game is played on a 10x10 grid.
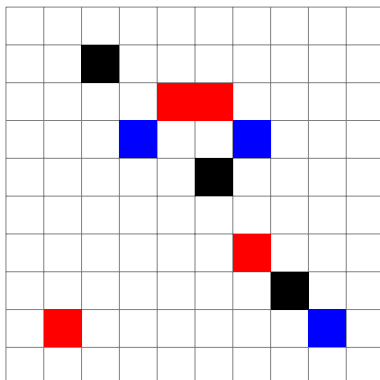
Objective

The primary goal in Snort is to force the opponent into a position where they are unable to make a legal move. This is achieved by occupying strategic positions on the board and limiting the opponent's available moves.

Players

The game is designed for 2 players, each taking turns to place their marker on the board.
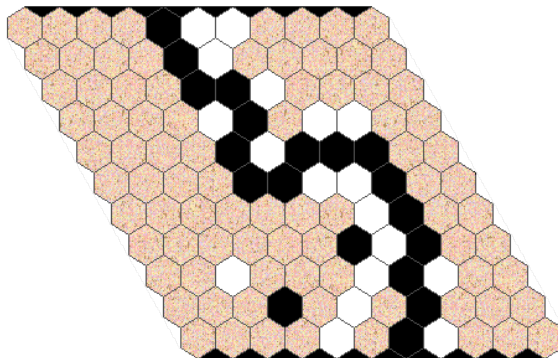
Board

The standard Snort board is a 10x10 grid. At the beginning of the game, three squares are randomly chosen to be "blocked," indicated by being filled in black. These blocked squares cannot be occupied by any player, adding an element of unpredictability and requiring players to adapt their strategies.

Rules

1. Players take turns coloring an uncolored square on the grid with their designated color (red or blue).
2. A player cannot color a square if it is adjacent (horizontally or vertically) to any square already colored by the opposing player.
3. The game ends when one player cannot make a legal move on their turn. The opponent is then declared the winner.

2   Hex

Hex is a strategic board game for two players. It was independently invented by Piet Hein in 1942 and John Nash in the 1940s. The game is played on a hexagonal grid, traditionally an 11x11 rhombus.

Objective

The objective of Hex is to connect opposite sides of the board with a continuous chain of one's own pieces. One player aims to connect the top and bottom sides, while the other aims to connect the left and right sides.

Board

The game is played on a hexagonal grid, typically an 11x11 rhombus, where each player has an allocated color. In computer implementations of Hex, the board can be represented as an 11x11 square grid for simplicity. Each cell (i, j) on this grid can be considered to be connected to six adjacent cells: $(i - 1, j)$, $(i - 1, j + 1)$, $(i, j - 1)$, $(i, j + 1)$, $(i + 1, j - 1)$, and $(i + 1, j)$, effectively mimicking the connectivity of the hexagonal cells.

## Rules

1. Players take turns placing a piece of their own color on a single hexagon on the board.
2. The game ends when one player successfully forms an unbroken chain of their pieces connecting the two opposite sides of the board they are assigned. This player is declared the winner.

   Remark: There is no possibility of a draw in Hex. If all hexagons are filled, there is always a winner.

3   Dots and Boxes

Dots and Boxes is a classic pencil-and-paper game for two players, originally invented by French mathematician Edouard Lucas in the late 19th century. It involves drawing lines between dots on a grid to form boxes. The player who completes a box gets to claim it.

Illustration of a Game in Progress
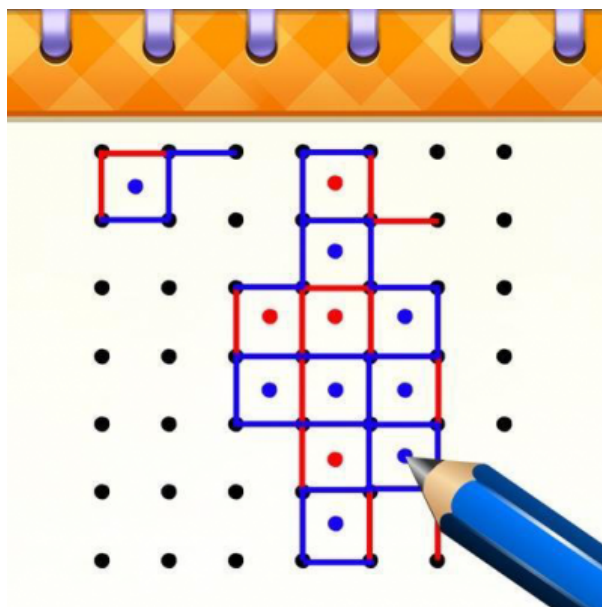
Objective

The goal in Dots and Boxes is to complete more boxes than your opponent by the end of the game. Players take turns drawing lines between adjacent dots on an 8×8 grid. When a player completes the fourth side of a box, they earn a point and take another turn.

Board and Gameplay

The standard game is played on an 8×8 grid of dots. Players take turns adding a single horizontal or vertical line between two unconnected adjacent dots. A player who completes the fourth side of a 1x1 box earns a point and another turn. The game ends when no more lines can be added, and the player with the most points wins.

For implementing Dots and Boxes in a computer program, an efficient approach is to use a pair of matrices to represent the edges on the board: one 8×7 matrix for horizontal edges and one 7×8 matrix for vertical edges. Each cell in these matrices can hold a value indicating whether the corresponding edge has been drawn.

4   Gomoku

Gomoku, also known as Five in a Row, is a traditional board game that is played with Go pieces (black and white stones) on a Go board. It originates from Japan.
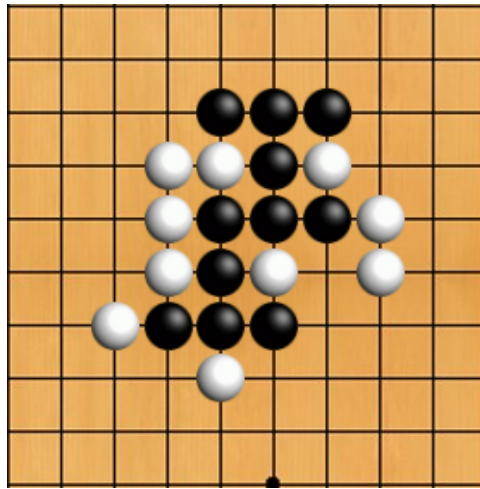
Objective

The objective in Gomoku is for a player to place five of their stones in an unbroken row horizontally, vertically, or diagonally.

Rules

1. The game is played on a Go board, which is traditionally a 19x19 grid. However, beginners may start on smaller boards, such as 15x15 or even 9x9.

2. Two players alternate turns, starting with Black. Each player places one stone of their color on an empty intersection of the grid per turn.

3. The first player to align five stones of their color in an unbroken row, whether it be horizontally, vertically, or diagonally, wins the game.

4. There are no restrictions on where a stone can be placed.

5   Othello

Othello, also known as Reversi, is a classic strategy game played on an 8×8 board. The game involves two players, one controlling the black pieces and the other controlling the white pieces, with the objective to have the majority of the board occupied by their color by the end of the game.

Starting Position
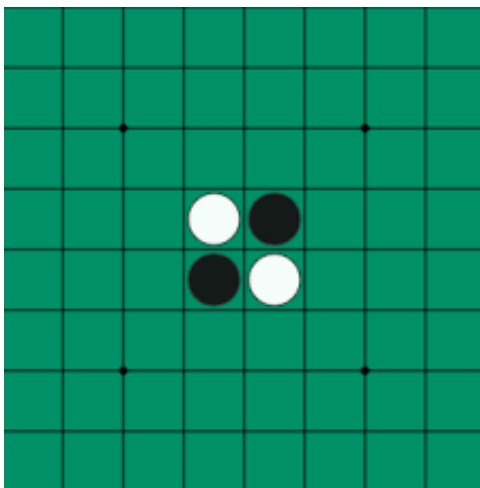
Objective

The goal in Othello is to have the majority of the board's disks flipped to your color when the last playable empty square is filled.

Gameplay

1. The game starts with four disks placed in the center of the board in a square pattern: two white and two black, with opposite colors diagonal to each other, all illustrated above.

2. Players take turns placing one of their colored disks on the board, with the requirement that it must flank one or several of the opponent's pieces.

3. Any of the opponent's pieces that are flanked by the newly placed disk and another disk of the player's color are flipped to the player's color, as illustrated below:
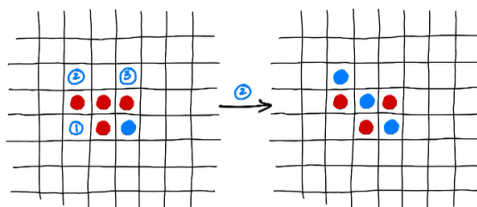
4. The game ends when neither player can make a legal move, typically when the board is full. The player with the most pieces of their color on the board at the end of the game wins.

6 Kamisado

Kamisado, invented by Peter Burley, is an abstract strategy game that was inspired by a colorful tile pattern.

Game Board

The board for Kamisado is an 8x8 grid, with each square colored in a specific pattern as illustrated above. Each player has a set of eight towers with eight colors matching the board's colors.

Objective

The goal is to be the first to move one of your towers to the opponent's home row.

Gameplay

- Players alternate turns, moving one of their towers.

- A tower moves in a straight line, forward or diagonally forward, to any unoccupied square.

- Towers can move any distance, but cannot jump over or capture opponent towers.

- The tower that is moved has to match the color of the square the opponent's last move ended on. For example, if one player lands on a pink square, the next player has to move their pink tower.

7   Amazons

The Game of Amazons is a strategic board game that combines elements of chess and go. It was invented in 1988 by Walter Zamkauskas, focusing on area control and blockade.

Game Board
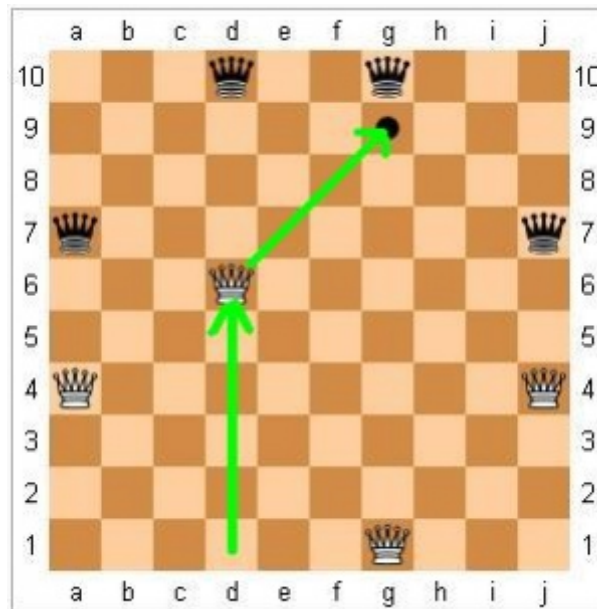
Objective

The objective is to use the Amazons to shoot arrows that block squares, aiming to limit the opponent's mobility and trap their Amazons.

Gameplay

- The game is played on a 10x10 board, with each player starting with four Amazons.

- Players take turns, and ech move has two parts: Moving an Amazon like a queen in chess, and then "shooting an arrow" from the Amazon's new position to block a square.

- It is impossible to capture pieces or arrows or to jump over them. As the game proceeds, more and more squares become blocked by arrows.

- Starting positions for White's Amazons are on squares d1, g1, a4, and j4, while Black's Amazons start on a7, j7, d10, and g10.

- The last player to make a legal move wins.

8 Abalone

Abalone is an abstract strategy board game designed by Michel Lalet and Laurent Lévi in 1987. The game challenges players to push six of the opponent's marbles off the edge of the board.

Game Board
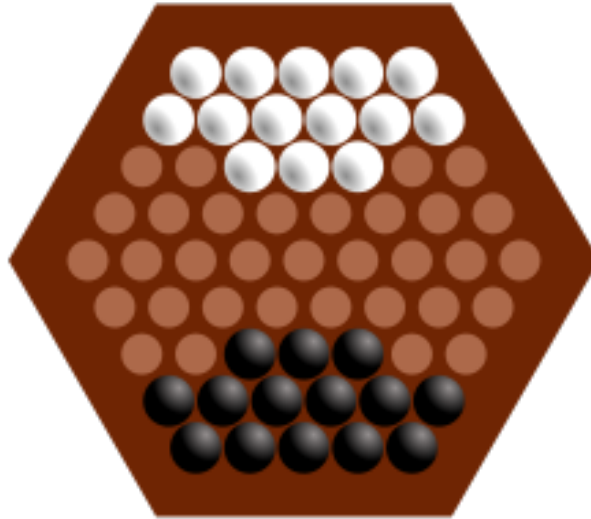
The Abalone board is a hexagon of circles, with 5 circles on each side. For computer implementations, this can be represented as a two-dimensional 9×9 matrix with certain indices marked as non-existent to account for the hexagonal layout.

Initial Position

Players start with 14 marbles each, positioned as illustrated above at opposite ends of the board.

Rules

- Moves are made by pushing marbles either singly, in pairs, or in threes.
- Marbles can move to an adjacent space or push opposing marbles if they outnumber them.
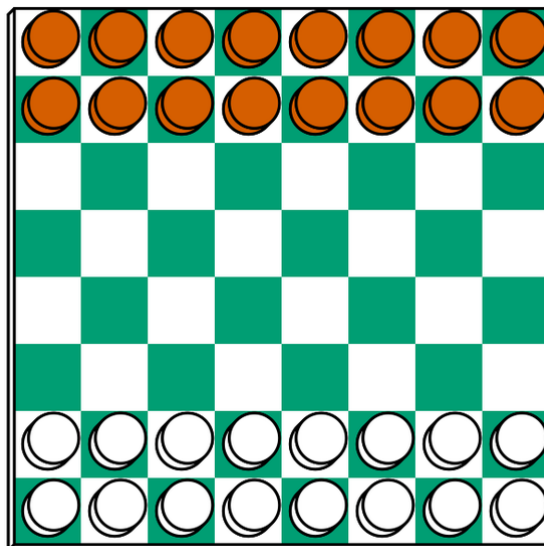- A push requires a free space behind the opposing marbles.

Winning Conditions

The player who first pushes six of the opponent's marbles off the board wins.

9   Breakthrough

Breakthrough is a strategic board game invented by Dan Troyka in 2000, inspired by so-called pawn chess.

Game Board

The game is played on an 8x8 grid, similar to a chessboard. Each player starts with 16 pieces positioned on their first two rows.

Rules and Gameplay

- Players move one piece per turn, either straight or diagonally forward, to an adjacent unoccupied square.

- Pieces can capture the opponent's pieces by moving diagonally into their square, like pawn captures in chess.

- The objective is to reach the opposite side of the board first. The first player to do so wins the game.

10 SOS Game

SOS is a strategic pencil-and-paper game that increases in complexity with a larger board. An 8x8 board size balances complexity and strategic depth, providing ample opportunity for strategic placements and counter-moves.

Game Board
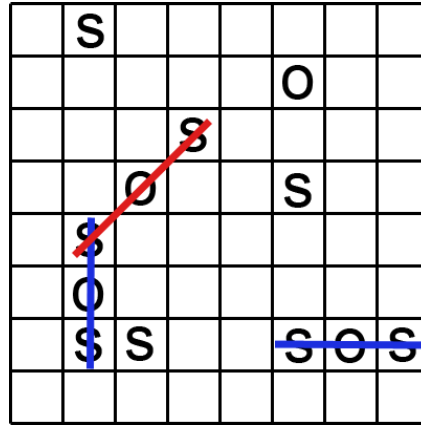
The game is played on an 8x8 grid, where players alternate writing either "S" or "O" in an empty square with the goal of creating consecutive "SOS" sequences.

Objective

To form as many "SOS" sequences as possible, horizontally, vertically, or diagonally.

Gameplay and Rules

- Players take turns to add either an "S" or an "O" to an empty square.

- The game does not assign specific letters to players; either player can place both "S" and "O".

- A point is scored for each SOS sequence formed. A single move can score multiple points if it creates more than one sequence.

- When a player completes an SOS sequence, they get another turn.

- The player with the most points when the grid is full wins the game.

11   Cram

Cram is a classic combinatorial game that tests strategic thinking and spatial reasoning. In this variant, the game is played on a 6x6 grid with five squares randomly chosen to be blocked at the start.

Objective

The goal in Cram is to be the last player to make a legal move by placing a domino on the grid. If a player cannot make a move, they lose, and their opponent wins.

Gameplay and Rules

- The game begins with a 6x6 grid where five squares are randomly blocked. These blocked squares are unplayable.

- Two players alternate turns, each placing a domino (a 1x2 or 2x1 tile) onto two adjacent, unoccupied squares of the grid.

- Dominos cannot overlap blocked squares, previously placed dominos, or extend outside the grid.

- The game ends when a player cannot place a domino on their turn. The other player is declared the winner.

Initial Setup

Here is an example of a 6x6 grid with five randomly blocked squares:
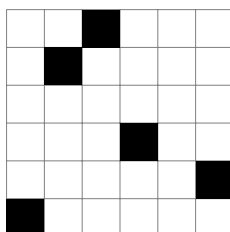
11.1   Example

In the following diagram, the last move is the red rectangle - which wins the game.