CSIT113
Problem Solving

Workshop – Week 4

Negation

- There are two natives A and B
- A says “B is a knight equals I am not a knight”
- What can you determine about A and B?

Handshake Problem

- Suppose that at a party, some people shake hands and some do not. Suppose each person counts the number of times they shake hands. Show that at least two people have the same count.

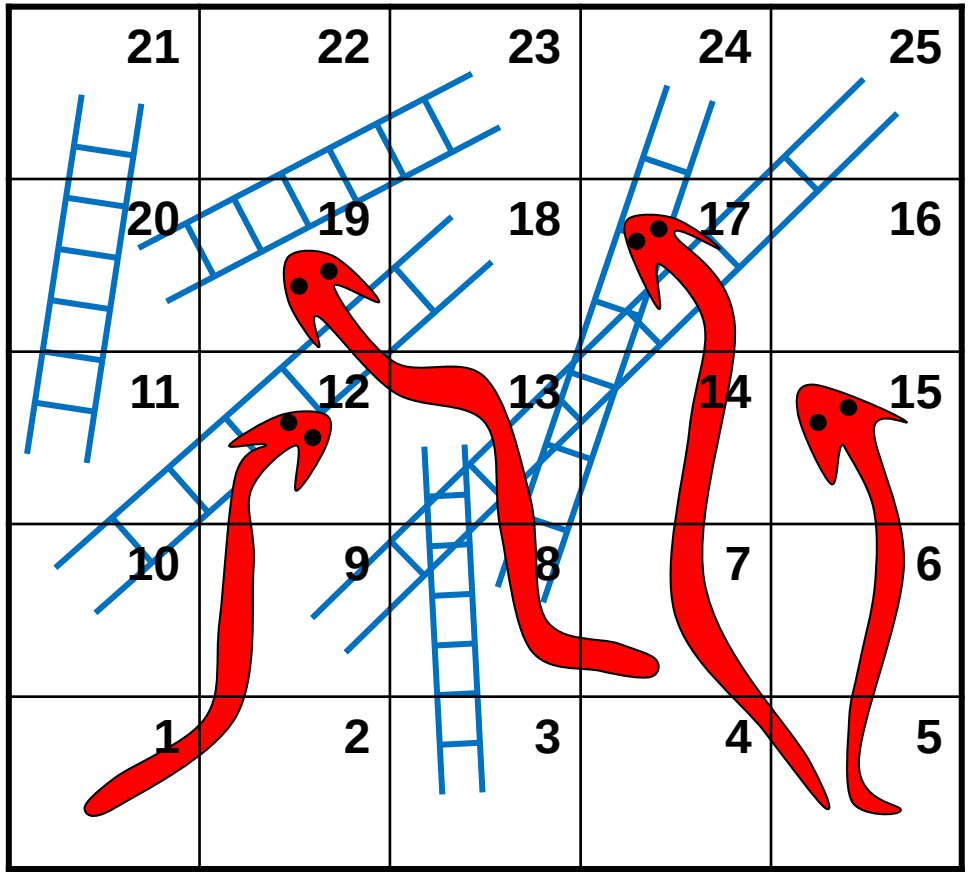
Games (Week 3B continued)

- We consider again two-person games.
- The key to winning is the ability to recognise and take advantage of, invariants.
- Often the winning strategy involves making the move that maintains the invariant.

Snakes and Ladders

- The board on the next slide is used for a game like “Snakes and Ladders”.
  - The two players take turns to move a single counter at most 4 spaces forwards.
    - There is only one counter in the game.
  - The start is square 1.
  - The end is square 25.
  - The winner is the player who gets to square 25.
  - Snakes (down) and Ladders (up) work as in the normal game

The Board



Snakes and Ladders

- If you stop on a square with a snake head, you move the counter to the square at the tip of the snake's tail. (You slide down the snake.)
  - E.g. if you stop on square 12 you slide down to square 1.
- If you stop on a square with a ladder bottom, you move the counter to the square at the top of the ladder. (You climb the ladder.)
  - E.g. if you stop on square 3 you climb up to square 13.

What do you need to do?

- Play the game through to get a feel for what is happening.
- List the valid positions in this game.
  - Where can the counter be?
- Identify the winning and losing positions.
  - Use the following rules :
    - A losing position is one where every possible move leads to a winning position.
    - A winning position is one where there is at least one move leading to a losing position (so we can force the opponent into a losing position).
    - Clearly, 25 is a losing position.
- Some positions cannot be immediately identified as winning or losing positions. Why not?
- How can we win?