CSE 373 Optional Section
Disjoint Sets & Homework 4

February 13, 2014

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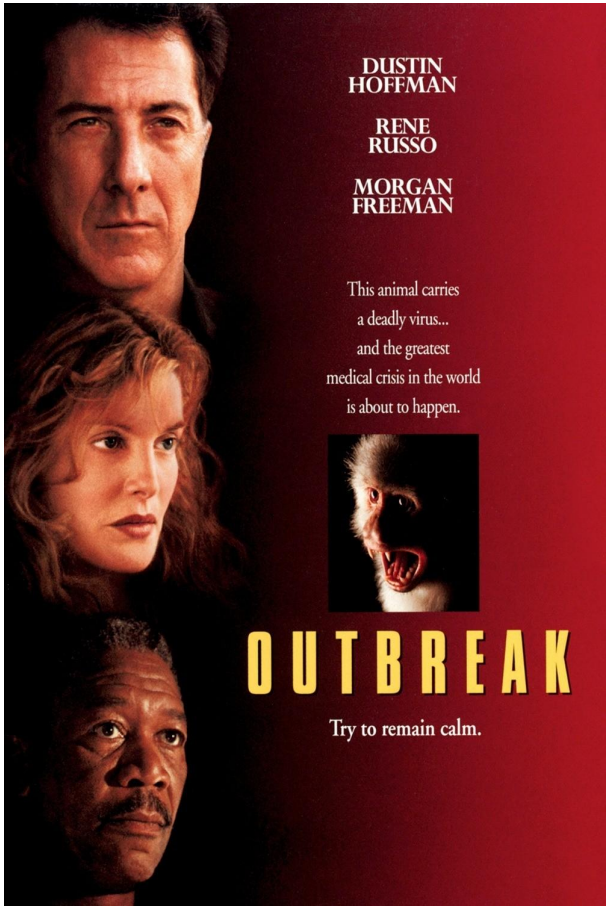
Agenda

- Disjoint Sets Review
- Homework 4 Examples

Disjoint Sets Review



OUTBREAK trailer

Interactive Example

HW4: Representation?

- What data structures do we want?
- Java Collections
- HashMap, HashSet, Arrays, ArrayList, etc.
  - Examples:
    - Two arrays, for vertical and horizontal walls
    - A Class for maze walls, stored in a HashSet

HW4: What Numbers Matter?

- How many rooms are in the maze?
- Height or Number of Rows
- Width or Number of Columns
- How many interior walls?
- How many exterior walls?

HW4: By The Numbers

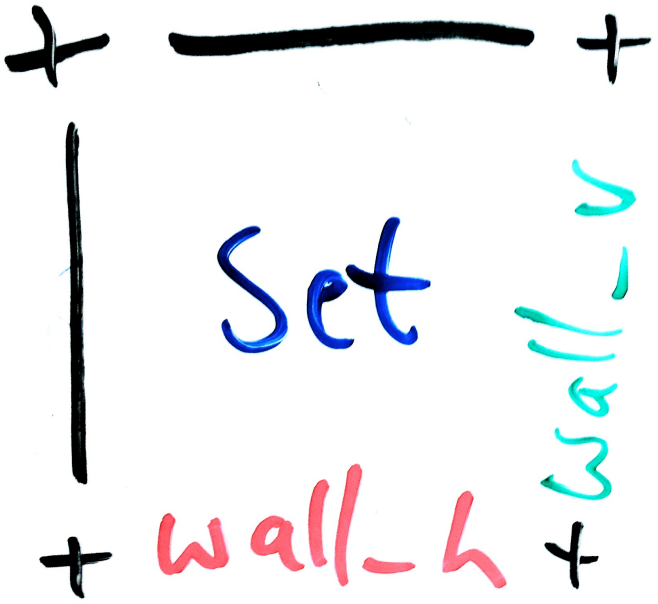
- For a maze with 4 rows and 5 columns:
- 20 total rooms
- 49 walls
- 31 interior walls
  - 16 vertical interior walls (4 x 4)
  - 15 horizontal interior walls (3 x 5)

HW4: By The Numbers

- For a maze with 3 rows and 7 columns:
- 21 total rooms
- 52 walls
- 32 interior walls
  - 18 vertical interior walls (3 x 6)
  - 14 horizontal interior walls (2 x 7)

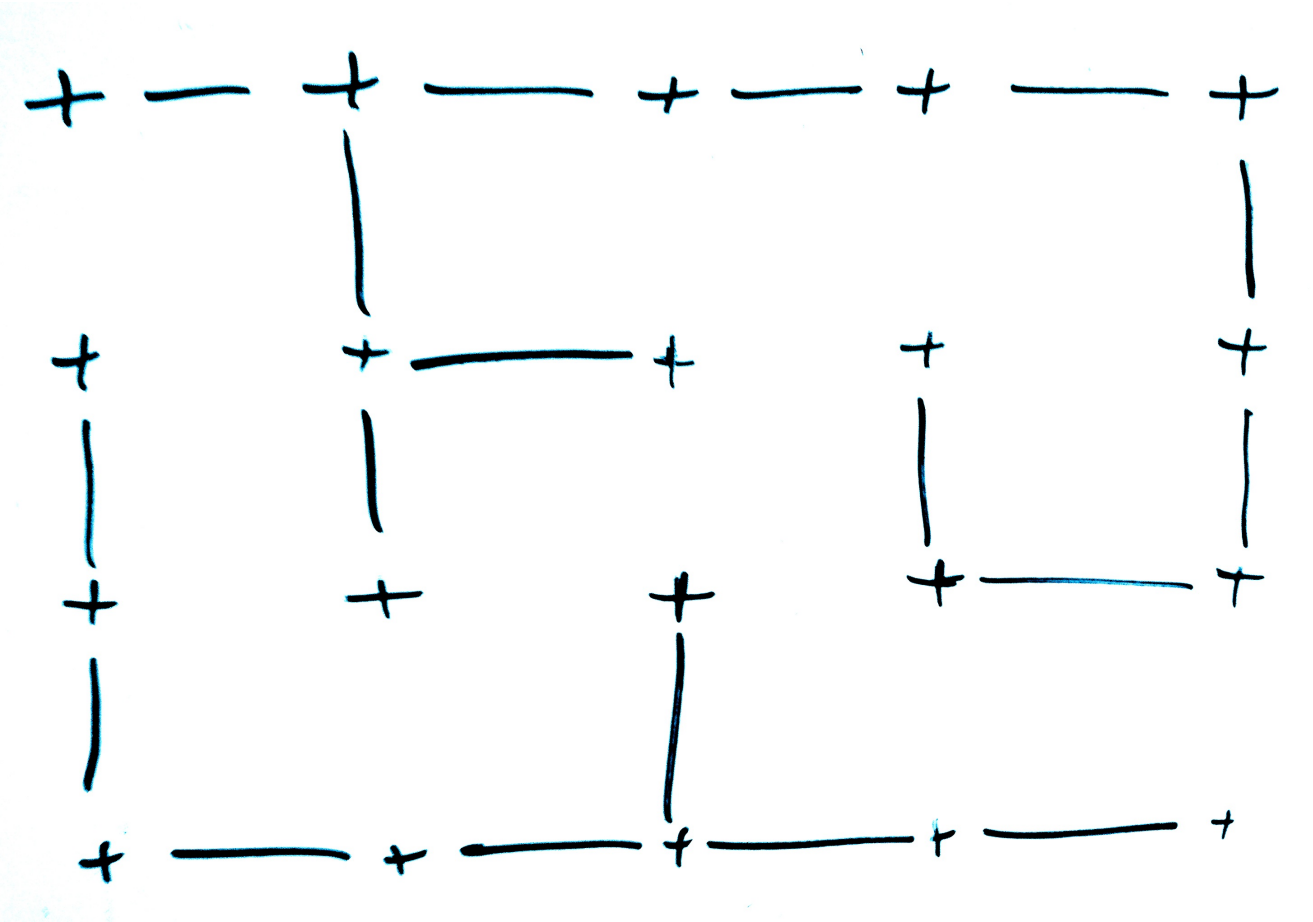
HW4: Consistent Identification

One Example: Each room is responsible for knowing its set and its walls left of and below it.



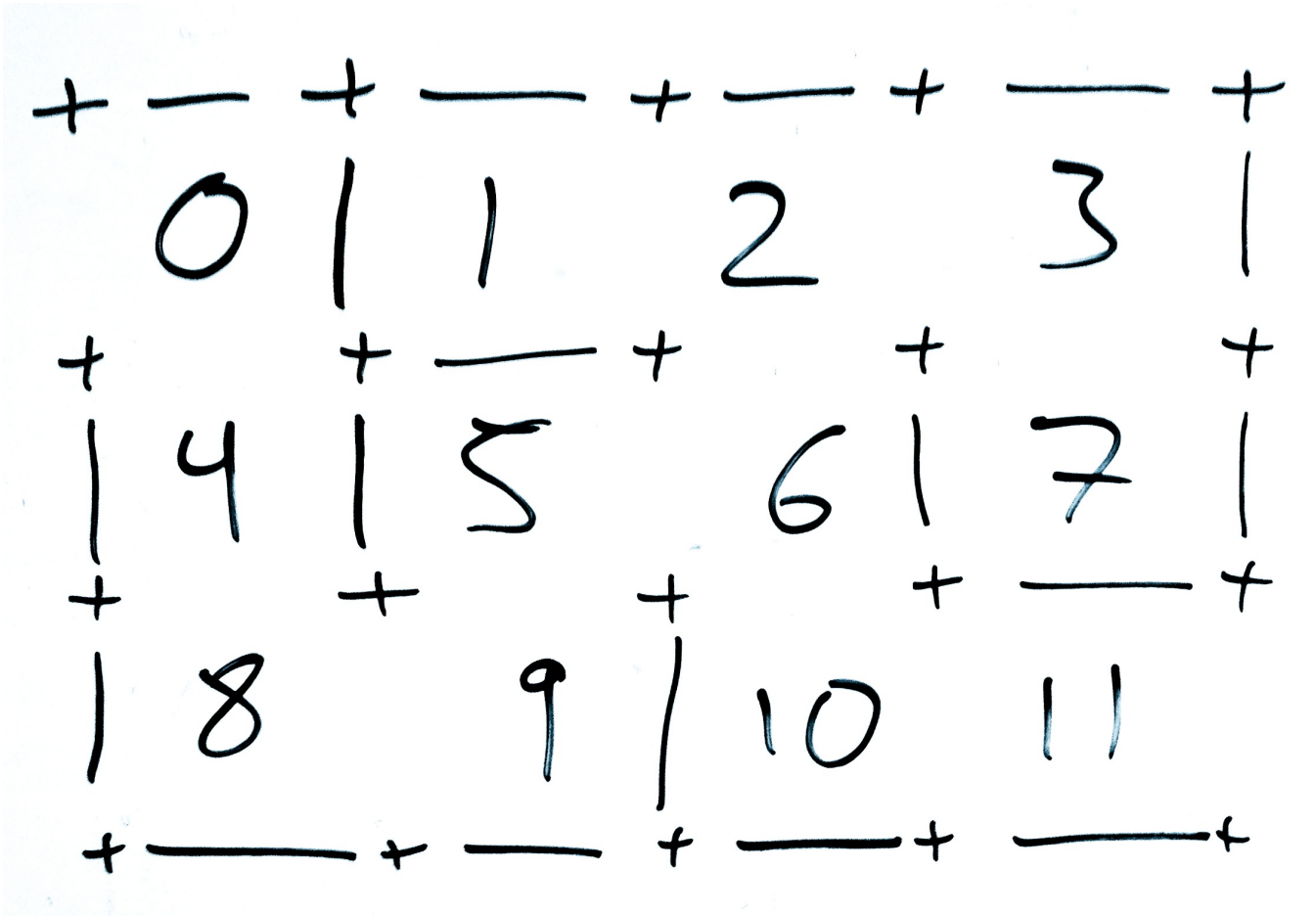
HW4: Example Maze

height = 3, width = 4



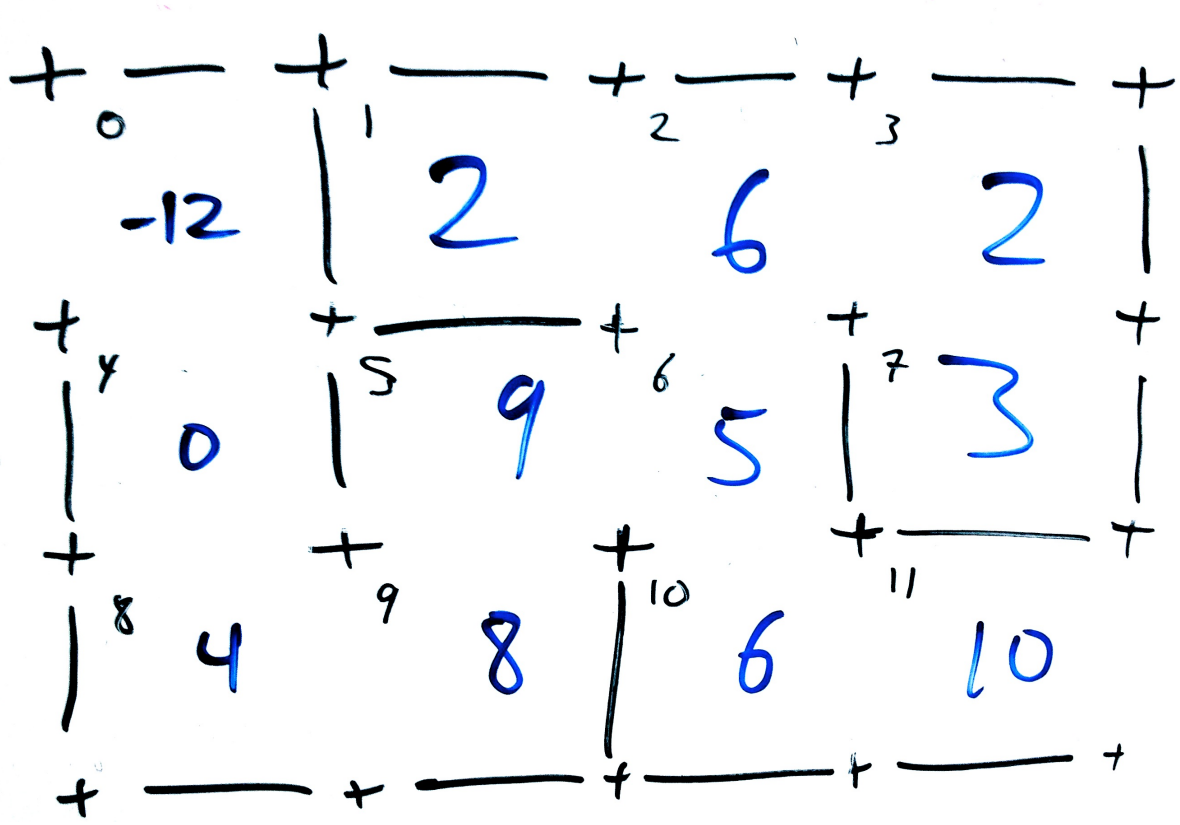
HW4: Example Maze

Number the rooms



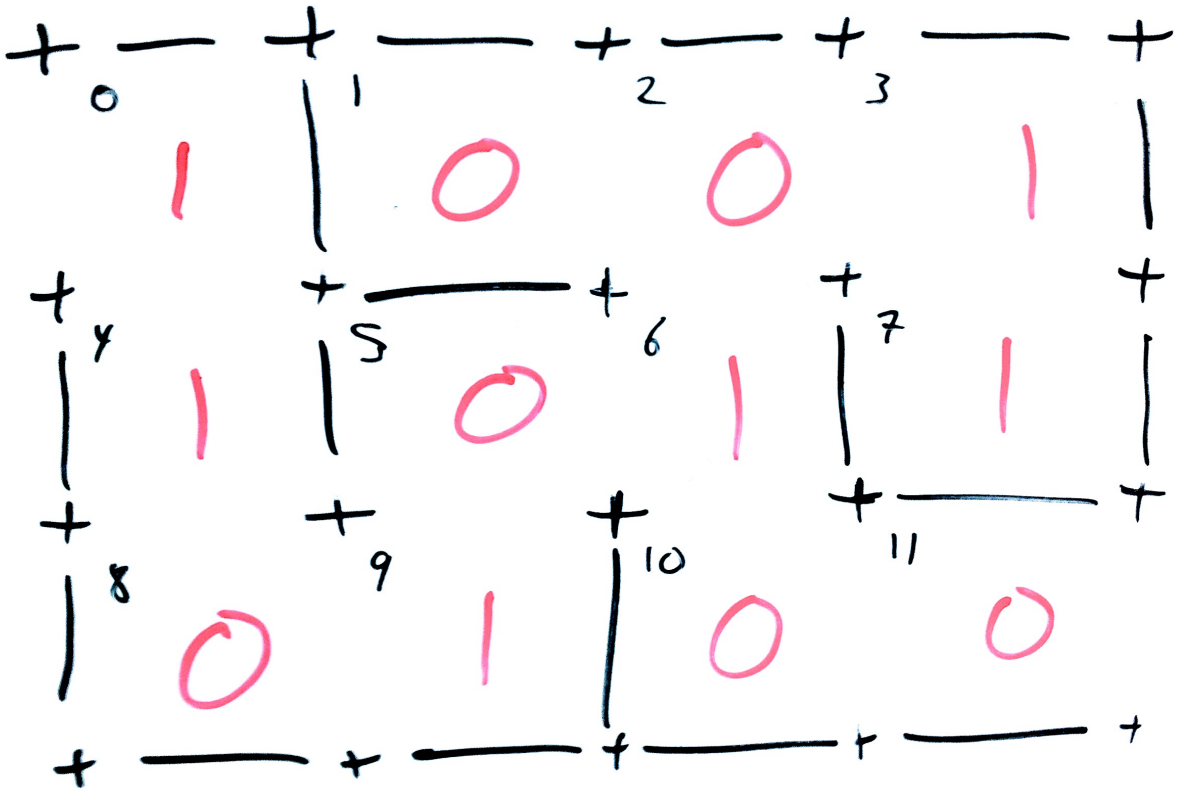
HW4: Example Maze

After uniting all of the nodes, the Disjoint Sets array looks like this:



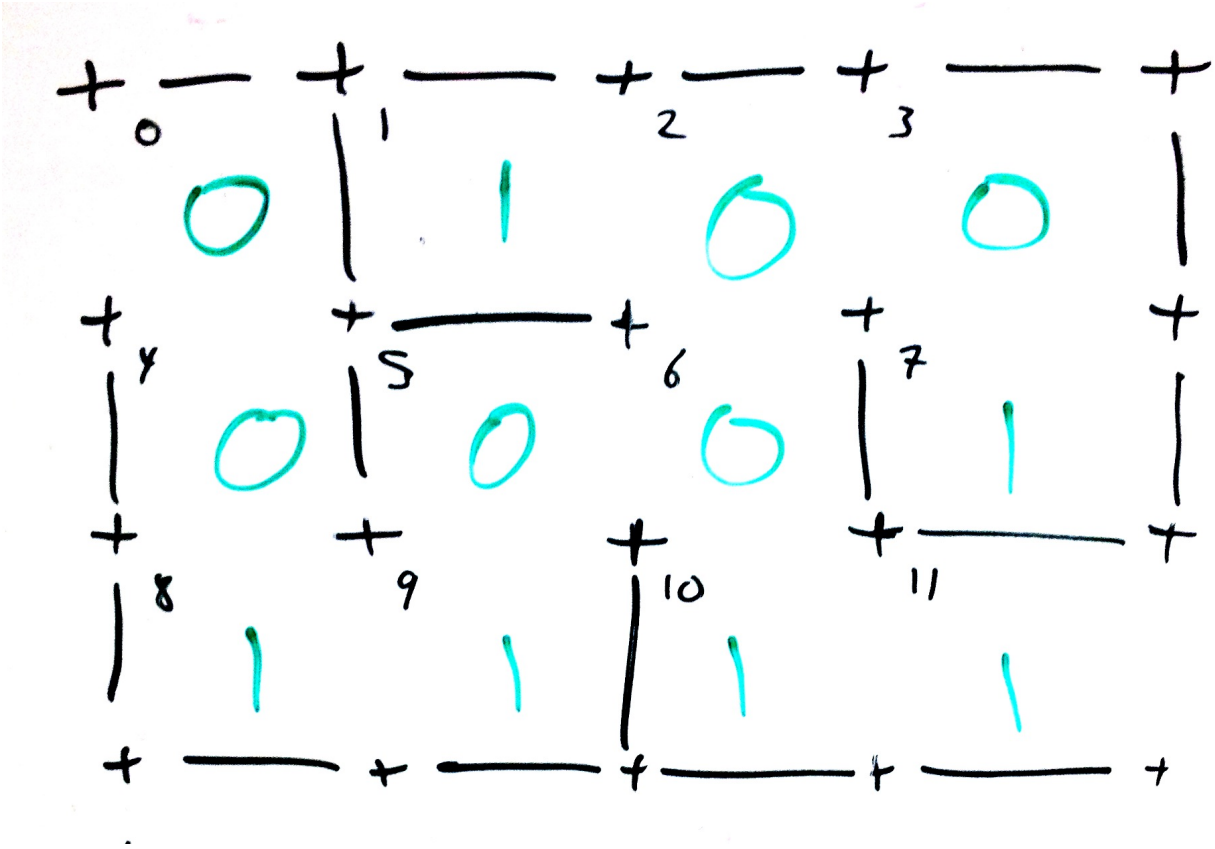
HW4: Example Maze

The walls to the left of each room are valued as such (1 means that the wall is in the maze)



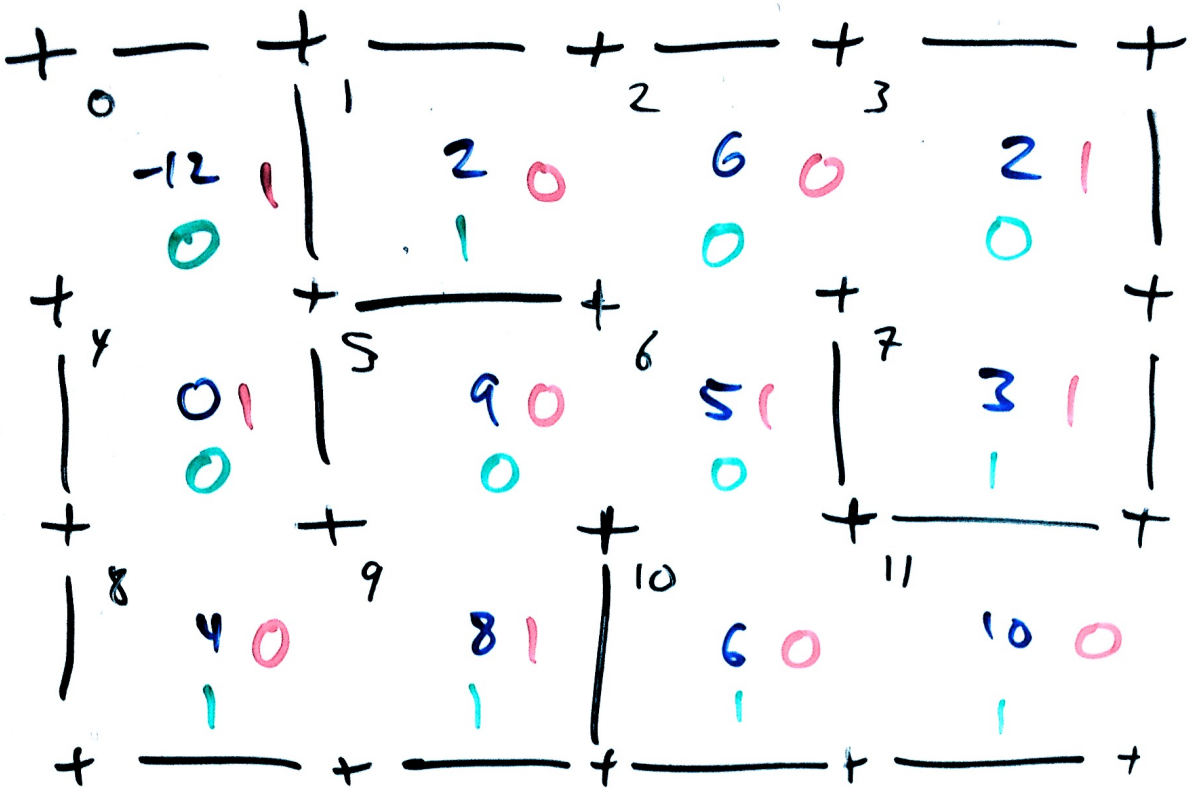
HW4: Example Maze

Likewise, for the horizontal walls below each room:



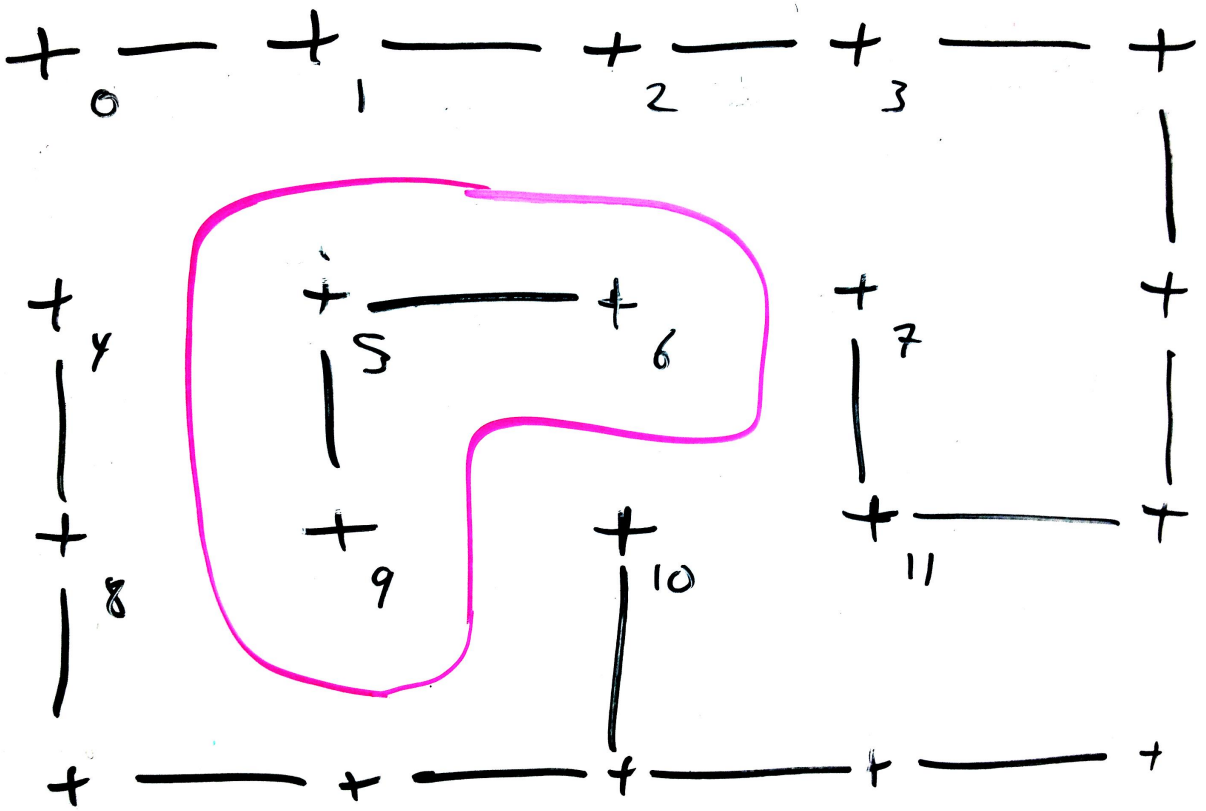
HW4: Example Maze

All together, the numbers for the rooms and the walls look like this:



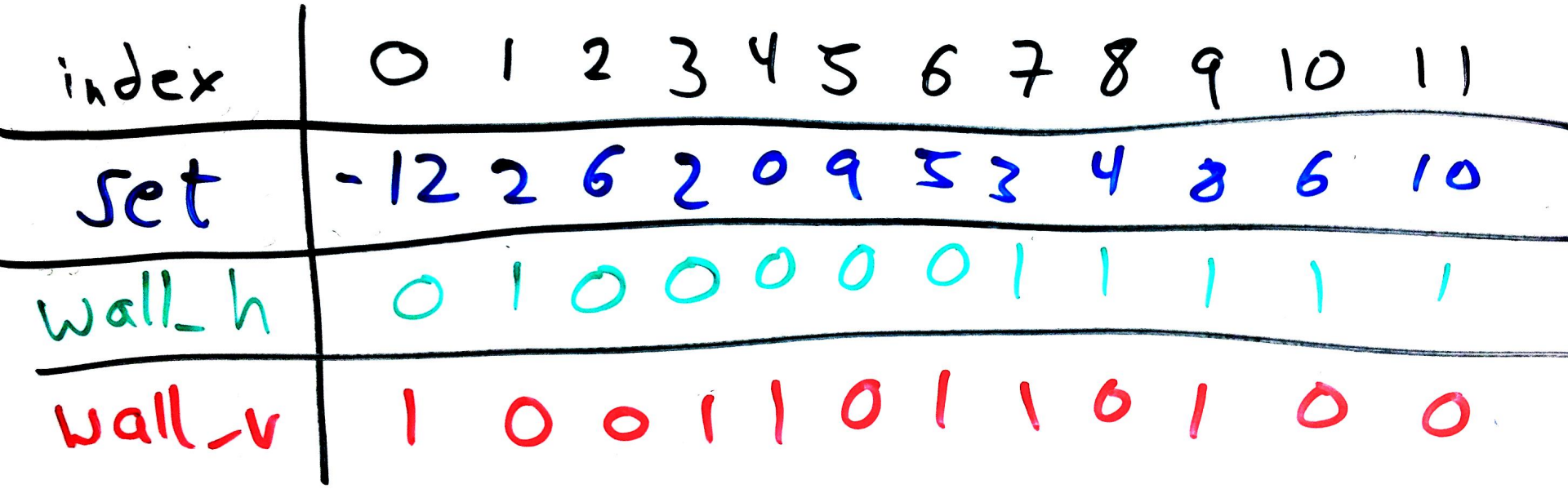
HW4: Don't Create Cycles

Every time you remove an interior wall it is possible that you created a cycle:



HW4: Example Maze

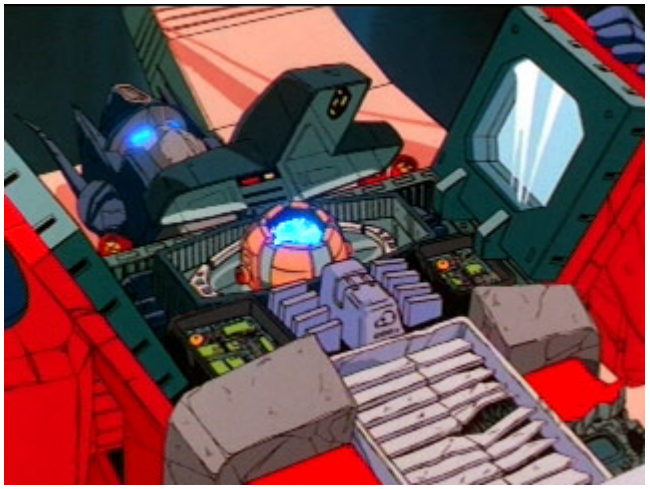
With 3 arrays that look like this:



HW4: MazeBuilder

- Find wall to remove
  - Find at random, rooms, walls, and/or neighbors
  - Make sure you want to remove it
    - Its neighbors are disjoint but adjacent
    - Its not exterior
- Check if you should continue removing walls

"Until all are one…"



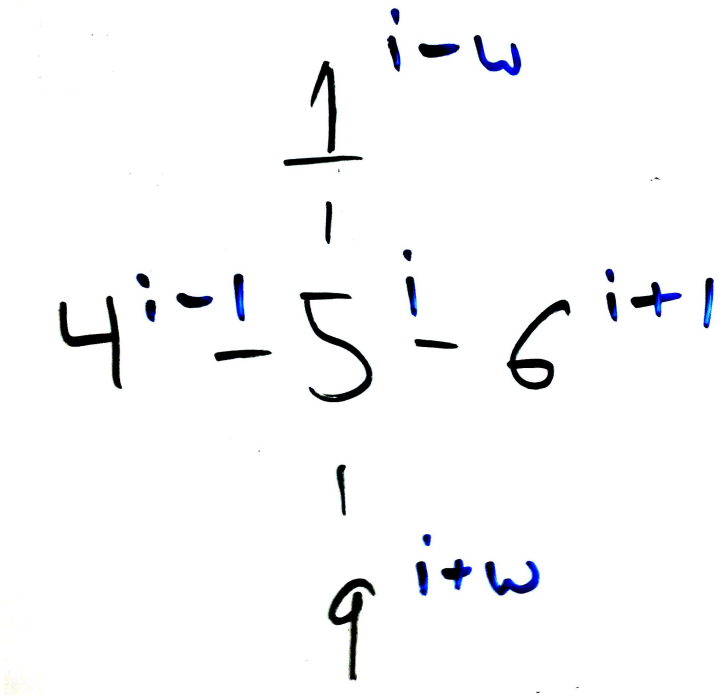
HW4: MazeBuilder

To print your mazes:

- Make the top row of walls
- For each row
  - Make a row of rooms and vertical walls
  - Make a row of horizontal walls below this row of rooms
- Make the bottom row of walls
- Make sure that you have an opening at the entrance and exit

HW4: Locations

Checking for adjacency where ***w*** is the width and ***i*** is the index of your room. Make sure to not modify or jump over exterior walls.



HW4: MazeSolver

The solution is 0 4 8 9 5 6 10 11