Homework 1: Basic C

Focus

- C Basics
- Command line arguments
- Dynamic memory allocation

Details

We are going to implment Conway's well known Game of Life. You can find more than you need to know at, e.g., the Wikipedia entry. But all you really need is the rules. For convenience, I will repeat them here:

- Any live cell with fewer than two live neighbours dies.
- Any live cell with two or three live neighbours lives on to the next generation.
- Any live cell with more than three live neighbours dies.
- Any dead cell with exactly three live neighbours becomes a live cell.

So what other details are there?

- Our program will read in a file depicting an initial configuration for the world. By default, the file's name will be "life.txt". A different file name may be specified by the user on the command line.
- The program will generate and display a "world" based on the input file. The actual number of rows and columns in the world may be different than what is in the file. Default values for both the number of rows and the number of columns will be 10. Again, different values can be provided on the command line.
- If there are fewer lines in the file or some lines are shorter than expected, the missing "cells" will be assumed to be dead.
- If there are more lines in the file or some lines are longer than expected, then ignore the extra cells.
- After displaying the initial state, the program will proceed to calculate some number of additional generations, displaying each in turn. The number of generations will be 10 by default, but a different value may be provided on the command line.
- The program is run from the command line as follows: `life rows columns filename generations`
  Note that all values are optional, so the program might be run as:
  - `life`

    - `life rows columns`
    - `life rows columns filename`
    - `life rows columns filename generations`
- where rows, columns and generations are all numbers for the specified values to override the defaults and filename is similarly the name of a file to use instead of life.txt.
- An example input file and the corresponding output file are attached.
- All output should go to standard output.