CS211: Programming Assignment 3:
Functions operating on 2D Arrays and Strings

DUE: Thu October 7 by 11:59PM

You are part of a startup called `ASCII-unlimited`. You plan to dominate the market in character based graphics for gaming! Your team has identified a set of 13 fundamental operations that are likely to be useful for many of the games you ultimately produce. Accordingly, you are developing a library of C functions which implement these operations.

For this assignment you will write these 13 functions. There are 11 functions operating on square dynamically allocated 2D arrays of characters and 2 operating on C strings.

The table below lists the function prototypes and assigns each an estimated difficulty level on a scale of 1-3 (just for rough guidance -- you may or may not end up agreeing with the scores…)

FUNCTION	**ESTIMATED DIFFICULTY (1-3).** **1: less challenging** **3: more challenging**
`char ** alloc_square_mtx(int n);`	1
`void free_square_mtx(char **m, int n);`	1
`void pop_mtx_alpha(char **m, int n);`	1
`void display_mtx(char **m, int n);`	1
`void swap_rows(char **m, int r1, int r2, int n);`	2
`void swap_cols(char **m, int c1, int c2, int n);`	2
`void rotate_right(char **m, int n);`	3
`void floating_boulders(char **m, int n);`	1.5
`void mountains(char **m, int n);`	2
`void sink(char **m, int n);`	2.5
`void gravity(char **m, int n);`	3
`void str_trim(char *s);`	3
`int str_search(char *s, char *pattern);`	3

What To Do

1. Download the files `prog3.h` and `prog3.c` from the src directory (from the same location you found this handout).
    - **`prog3.h`** is a header file which you are not supposed to modify. It contains the function prototypes and, more importantly, the detailed description of how the functions are supposed to behave.
    - **`prog3.c`** is where you will do your work -- completing the implementation of the functions. It is pre-populated with function "stubs" along with a **`main`** function where you can write your test code to exercise your implementations.

      However, do not remove
2. Read through the "banner comments" above each function prototype in `prog3.h`. Maybe print out a hardcopy for reference. These comments explain the expected behavior of the functions -- i.e., they are the "specs" for this assignment.
3. Start working on the functions!
    - Test each function (and debug it accordingly) before moving on to the next.
    - Start with the easier functions.

Submission

You will just submit your completed implementation file `prog3.c` through blackboard. You do not need to submit `prog3.h` because it should be unchanged.

Some Things to Remember

- You are NOT modifying `prog3.h`. All of the code you write will be in `prog3.c`.
- C strings are "sentinel-terminated" (the "end of string" character `'\0'` marks the end of the string).
- The functions operating on 2D arrays work on 2D arrays of characters. These are *not* strings; nor are they arrays of strings.