# Homework 4 - Graphs and BFS

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The objective of this homework is to implement graphs and BFS searches in C. This time, the homework consists of multiple files and a Makefile. It will be up to you to go through the program and determine where everything is located and how they function.

Given an input file containing an adjacency matrix,

- Calculate the adjacency list by implementing the `construct_adj_list` function.
- Implementing `construct_adj_list` will require a number of other functions. The function definitions for these are provided. Look for functions that have comments labeled `Part 2 - 4`
- Using the adjacency list, implement BFS using the algorithm described in class. The function is labeled `bfs()`.
- `bfs()` will also require another function - `remove_node()` (Part 6), in addition to the ones described above.
- Do not forget to implement a fucntion to free memory (see comment labeled `Part 7`)
- You must use the provided function definitions and use all of them appropriately.
- You may **not** add new functions. If you think you need to, come speak with me during office hours and get approval before you write your own functions.

For extra credit, implement BFS using SpMV. Some of the required function has already been implemented for you. This time, you may write everything from scratch if you wish to.

Note that you may choose not to include the extra information printed by the skeleton code in your final solution. These functions were provided just to help you get started in the right (or wrong) direction.

When you have completed your assignment, verify it on ix-dev. For this project, do not change the file names - just keep them as they are and implement the functions.

Grading:

- Working implementation for adjacency list calculation: 3
- Working implementation for BFS: 6
- Working implementation for memory deallocation: 1
- Extra credit 1 - correct implementation of BFS using SpMV: 5
- Extra credit 2 - no memory leaks in your code whatsoever: 5 (this is assuming you have done everything + extra credit 1)

**Extra credit** :

Have fun with your assignment and don't hesitate to post questions on Piazza if something is ambiguous. For this assignment, I expect you to be able to read someone else's code and figure out what is going on.