Problem Set 4 - Graphs

Problem C

Bertown Roads!! I remember this one being quite a funky one to figure out.I was still running off the high that I got from Question A and Question B, and trying to draw graphs, intuiting my way to a solution from observations that I made about graphs. I think this point was where it started to click that a lot of the questions that we were and would be given throughout the problem sets were closely related to the lecture content, and that I could often use the lecture slides to get me very close to an answer.

In this case, I do believe the lecture slides gave the complete answer. I was asking a friend about this question, and they told me to look at the lecture slides, after which I came across the bridge finding on a dfs tree example - and it all fell into place.

All that needed to be done in this question was run the bridge finding code on the graph, starting from any vertex - and if there were any bridges, we know that there is no way to orient the bridge such that everything on one side of the bridge can reach everything on the other side of the bridge and vice versa. If there were no bridges, we can set our dfs order of traversal as the direction of the edges, and then set the back edges going back up. In this way - every back edge would complete the cycle, and make sure that the entire graph is an SCC.

Please excuse my mildly sketchy explanations, it was quite a minute ago when I did this.