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5 Report: Strongly Connected Components

For the SCC class, the graphs in the next page have been used to test correctness. The corresponding strongly connected components can be found in the ExpectedOutput file.

You do not have to write any code. Instead, write a report on the SCC class, by using the algorithm description here: https://drive.google.com/drive/folders/1qXH8OMuBRkDewOzMaL2RbJwxAGcPeZSU?usp=sharing. In particular, explain the code by answering the following:

- What is the purpose of the step1Helper method? Explain the purpose of the stack here.

- What is the purpose of the step1 method? Clearly explain what algorithm is being run here.

- What is the purpose of the step2 method?

- What is the purpose of the step3 method? In particular, explain the following:

  - What is the purpose of the outer while loop?

  - What is the purpose of the inner while loop, and what is getting added to component? What algorithm is being run here?

  - After the inner loop terminates, what is being added to scc?

Caution: You should explain/answer the above in the context of what the method/statement/part of code achieves. Writing something like "*this code has a for-loop that goes over all the edges of a vertex*" will get you no credits. I do not want an English description of the code; I want an explanation of the code's purpose.

1. The purpose of the step1 helper method is to keep traversing around the graph until you run a closed or an already visited node on the graph.
2. The purpose of this method is to put each item into the stack in the latest order with the help of the step1 Helper function.
3. The purpose of this method is to compute the reverse adjacency list of the reverse graph.
4. The purpose of this step is visit each node and find the path to each node. We will pop the stack given to us in step1 and use the adj list to do this as well.
   a. The outer while loop maintains the position at which BFS or DFS will start at. We will move through the stack to get the paths. If the nodes have already been visited we simply pop the next node off the stack and continue.
   b. The purpose of this method is to run the DFS or BFS algorithm to traverse the graph given the node from the previous step.
   c. The purpose of this statement is to add the component which was just calculated with BFS or DFS and with the outer while loop. We are simply adding the list of integers that we calculated to be reachable in both directions.