CS208 · Algorithm Design and Analysis

Assignment 3

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Exercise 3.1, 3.3

1 Exercise 3.1

There are 6 kinds of topological orderings in total. That is $abcdef$, $abdcef$, $abdecf$, $adebcf$, $adbecf$, $adbcef$.

2 Exercise 3.3

Firstly using the topological ordering algorithm. When there are no nodes with 0 in-degree, there are two situations:

- When all the nodes are envolved, that is we have a topological ordering for the graph, then G is a DAG. The algorithm only needs to print the ordering.
- Otherwise G is not a DAG, that is there exists at least a circle in G. We only need to use DFS to search the graph. Similar to the flood fill algorithm, starting from any node, searching the nodes adjacently. Repeat this procedure until all nodes are visited. If it visits some nodes already been visited, then it is a cycle and just print it. Since G is not a DAG, there must be a cycle and we can find it by this procedure.