

Problem 4

Topological sort can be found using following algorithm:

- 1) remove all the vertices in the graph that have 0 incoming edges
- 2) after removing all the edges of such vertices, count the incoming edges of the remaining vertices
- 3) repeat the above steps on the remaining vertices until no node is left

Since there can be multiple vertices with 0 incoming edges, hence it is our choice which vertex to remove first. Hence, such choices give rise to different topological sorts of a graph.

For the given graph, we get total 6 different sorts:

$a \rightarrow b \rightarrow c \rightarrow d \rightarrow e \rightarrow f$

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$a \rightarrow b \rightarrow d \rightarrow c \rightarrow e \rightarrow f$

$a \rightarrow d \rightarrow b \rightarrow e \rightarrow c \rightarrow f$

$a \rightarrow d \rightarrow e \rightarrow b \rightarrow c \rightarrow f$

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