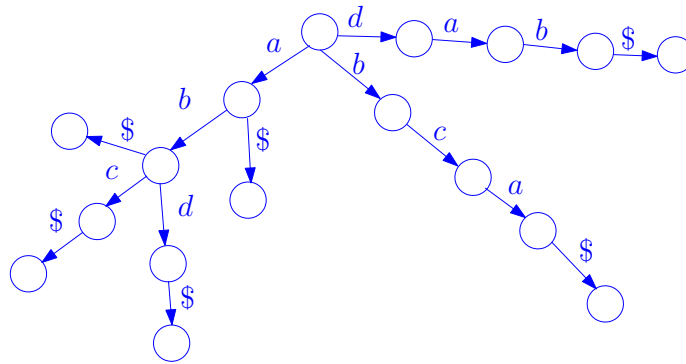


Practice Set 8 (Trie and Depth First Search)

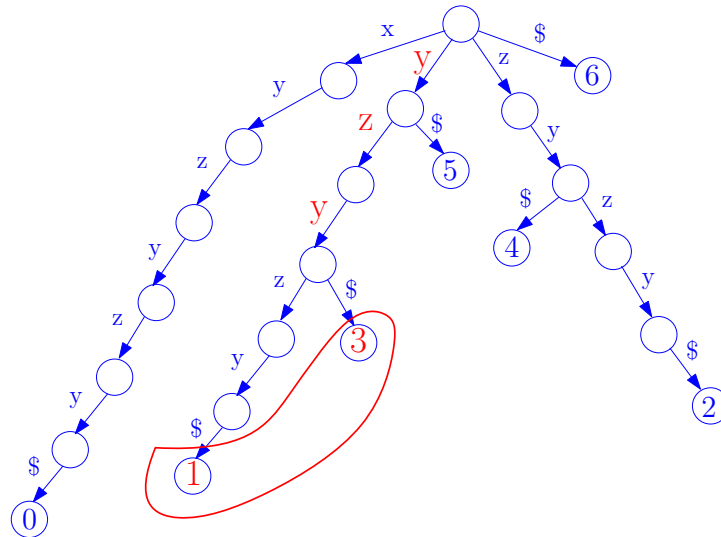
Data Structure (CS 223)

Q1: Show the trie for the following set of strings: $\{a$, abc, ab, abd, bca, $dab\}$.



Q2: Show the suffix trie for the text $T = xyzzyzy\$$.

- Mark the leaves that correspond to the suffixes prefixed by the pattern $P = yzy$.

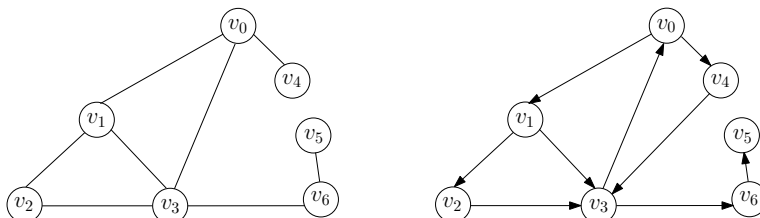


- How do you detect that $P = yzx$ has no occurrences in T ?

Answer: Match y , then match z , then x cannot be matched. Hence, $P = yzx$ has no occurrences in T .

Q3: Starting from node v_1 , illustrate the DFS algorithm on the following graphs. When you relax a vertex, insert adjacent vertices into the stack in increasing value of their indexes. Show:

- the stack, the closed sets, and the level array at each stage
- the final DFS tree.



Undirected Graph

	closed	stack	level array						
			v_0	v_1	v_2	v_3	v_4	v_5	v_6
At Start	\emptyset	$[v_1]$	∞	0	∞	∞	∞	∞	∞
Pop (Relax v_1)	v_1	$[v_0, v_2, v_3]$	1	0	1	1	∞	∞	∞
Pop (Relax v_3)	v_1, v_3	$[v_0, v_2, v_0, v_2, v_6]$	2	0	2	1	∞	∞	2
Pop (Relax v_6)	v_1, v_3, v_6	$[v_0, v_2, v_0, v_2, v_5]$	2	0	2	1	∞	3	2
Pop (Relax v_5)	v_1, v_3, v_6, v_5	$[v_0, v_2, v_0, v_2]$	2	0	2	1	∞	3	2
Pop (Relax v_2)	v_1, v_3, v_6, v_5, v_2	$[v_0, v_2, v_0]$	2	0	2	1	∞	3	2
Pop (Relax v_0)	$v_1, v_3, v_6, v_5, v_2, v_0$	$[v_0, v_2, v_4]$	2	0	2	1	3	3	2
Pop (Relax v_4)	$v_1, v_3, v_6, v_5, v_2, v_0, v_4$	$[v_0, v_2]$	2	0	2	1	3	3	2
Pop (Relax v_2)	$v_1, v_3, v_6, v_5, v_2, v_0, v_4$	$[v_0]$	2	0	2	1	3	3	2
Pop (Relax v_0)	$v_1, v_3, v_6, v_5, v_2, v_0, v_4$	$[]$	2	0	2	1	3	3	2

Directed Graph

	closed	stack	level array						
			v_0	v_1	v_2	v_3	v_4	v_5	v_6
At Start	\emptyset	$[v_1]$	∞	0	∞	∞	∞	∞	∞
Pop (Relax v_1)	v_1	$[v_2, v_3]$	∞	0	1	1	∞	∞	∞
Pop (Relax v_3)	v_1, v_3	$[v_2, v_0, v_6]$	2	0	1	1	∞	∞	2
Pop (Relax v_6)	v_1, v_3, v_6	$[v_2, v_0, v_5]$	2	0	1	1	∞	3	2
Pop (Relax v_5)	v_1, v_3, v_6, v_5	$[v_2, v_0]$	2	0	1	1	∞	3	2
Pop (Relax v_0)	v_1, v_3, v_6, v_5, v_0	$[v_2, v_4]$	2	0	1	1	3	3	2
Pop (Relax v_4)	$v_1, v_3, v_6, v_5, v_0, v_4$	$[v_2]$	2	0	1	1	3	3	2
Pop (Relax v_2)	$v_1, v_3, v_6, v_5, v_0, v_4, v_2$	$[]$	2	0	1	1	3	3	2

DFS Trees

