Week 3 Quiz

Your last recorded submission was on 2025-02-04, 23:20 IST Due date: 2025-02-12, 23:59 IST.
All questions carry equal weightage. You may submit as many times as you like within the deadline. Your final submission will be graded.

1) An undirected graph G on 37 vertices has 5 connected components. What is the minimum number of edges in G? ***2 points***

- ○ 36
- ◉ 32
- ○ 31
- ○ Depends on the sizes of the five connected components.

2) Suppose we have a directed graph G = (V,E) with V = {1,2,…,n} and E presented as an adjacency list. For each vertex u in V, L(u) is a list $[v_1,v_2,\ldots,v_k]$ such that (u,v_i) in E for each i in {1,2,…,k}. ***2 points***

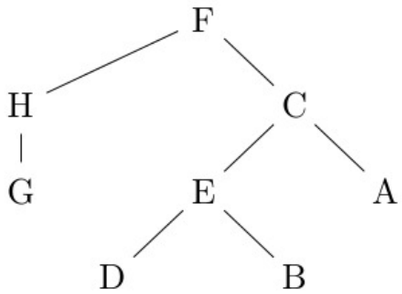
If we reverse the edges in G, we get a new graph $G_R = (V,E_R)$ with the same set of vertices such that (u,v) in E_R if and only if (v,u) in E.

We can represent G_R using an adjacency list where, for each u in V, $L_R(u)$ is the list of neighbours of u with respect to E_R.

Let n be the number of vertices in V and m be the number of edges in E. How long would it take to construct the adjacency lists $L_R(u)$, u in V, from the lists L(u), u in V?

- ○ O(m)
- ◉ O(n + m)
- ○ $O(n^2)$
- ○ $O(n^2 + m)$

3) Suppose we obtain the following DFS tree rooted at node F for an undirected graph Gr with vertices {A,B,C,D,E,F,G,H}. ***2 points***



Which of the following ***cannot*** be an edge in the graph Gr?

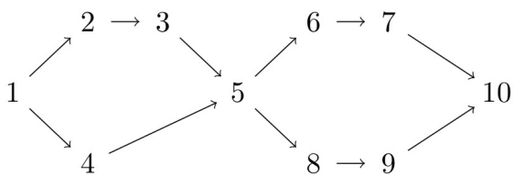
- ○ (F,G)
- ○ (B,C)

- ○ (A,F)
- ◉ (A,H)

4) We are interested in topological orderings of the following DAG that satisfy one or both of the following constraints: ***2 points***

- 4 appears before 3
- 8 appears after 7

How many such orderings are there?



- ○ 9
- ○ 13
- ○ 16
- ◉ 18

5) Assembling a laptop consists of several steps, such as fixing the motherboard, inserting the battery, putting in the keyboard, attaching the screen, etc. Suppose there are 10 steps, labelled A, B, C, D, E, F, G, H, I, J. Each step takes a day to complete and we have the following dependencies between steps. ***2 points***

- A must happen before H
- B must happen before F
- B must happen before G
- C must happen before H
- D must happen before E
- E must happen before B
- F must happen before A
- F must happen before C
- G must happen before F
- I must happen before D
- I must happen before G
- J must happen before D
- J must happen before I

What is the minimun number of days required to complete the interiors?

- ○ 9
- ◉ 8
- ○ 7
- ○ 6

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers