CS 374 HW 7 Problem 2

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TOTAL POINTS

80 / 100

QUESTION 1

12A 20/20

- √ 0 pts Correct
 - 20 pts Adding Every edge possible
- 10 pts Adding sub-optimal number of edges in linear time
- 10 pts Adding optimal number of edges in nonlinear time
 - 5 pts Doesn't work for disconnected DAGs
- 2 pts Number of edges added is wrong/not present
 - **15 pts** IDK
 - 20 pts Illegible/Lengthy

QUESTION 2

2 2B 0 / 20

- O pts Correct
- 10 pts Non-linear time algorithm
- √ 5 pts Not mentioning the sub-optimality of their algorithm
- √ 15 pts Used DFS or BFS
 - 20 pts Unclear/illegible/lengthy
 - 2 pts Minor error
 - 2 pts Minor Error
 - 20 pts Incorrect algorithm
 - 15 pts IDK
 - Solutions using BFS or DFS get 5 points. These algorithms would be incorrect because the nodes could have multiple parents and if along a different parent, the number of important vertices increases, you will have to update it all along the path, which means the algorithm is not linear anymore. Extra 5 points are cut for not noticing this bug.

QUESTION 3

3 2C 30 / 30

√ - 0 pts Correct

- 10 pts non-linear time solutions if state the correct runtime
- 15 pts non-linear time solutions if not state the correct runtime
- 30 pts unclear or way too lengthy answers
- 22.5 pts IDK

QUESTION 4

42D 30/30

- √ 0 pts Correct
- 3 pts Added edges from algorithm from Part A should have weight/length 0.
- **5 pts** Should assign all original edge weights to 1 (or equivalently, all original edge weights should be the same positive value) in order to run the algorithm from Part C
 - 10 pts Assuming a unique source in the graph
 - 30 pts Unclear / Incorrect Algorithm
- **2 pts** Must explicitly state the algorithm's runtime even if using the algorithm from Part C.
 - 22.5 pts IDK
- 15 pts Non linear algorithm

QZ A.). Do topological sorting of the list of verticies

30(n+m)

· for i=1 to 1:

get outgoing edges of Vi for each (Vi, Vi) EE, mark Vi is not source } o(n+m)

Total () (n+m) times

0 05 edges: let In be the # 05 sources in orginal

graph then add (h-1) edges

B) DE (W, COUNT) {

main it as vised

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```
26.)
Algoritm: lesoit 11 array of verticies
 lesalt = (Sine Some (S, O) Kesulth);
Some func (u, count, lesuit) {
     for each edge (u,v) in Out (u) {
           if v is not visited f
               Mark V as visited
               if (V is important) {
                   count ++;
               is (count = T){
                3 add v to result
                DFS (V, COUAL)
To get all vertices satisfy the condition,
 do: somefune (s. O, result)
```

2 2B 0 / 20

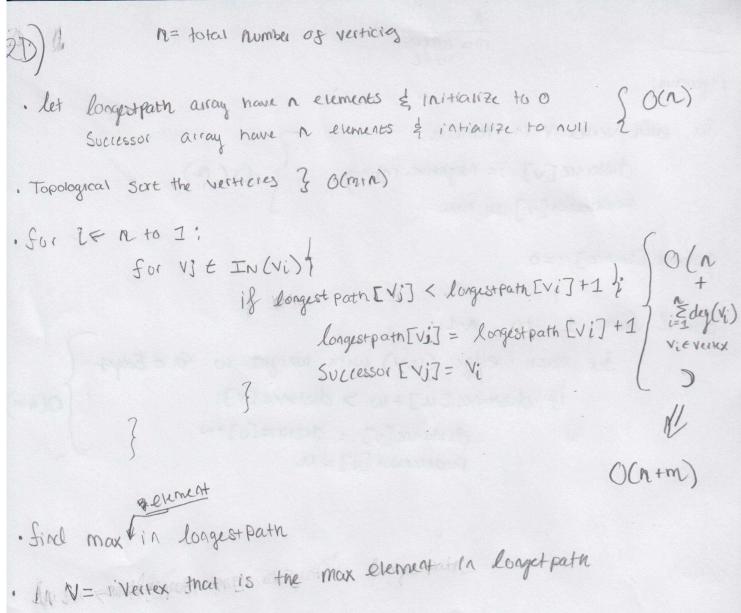
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· Do DFS(s) to find all vertices that can be reached 2C) · Do Topological sorting on these vertices and store the result in array A[1...n] with nbe the number of vertices in pach(s) · Let array Distance [1...n] store the longest path from S to Vi with vi be the vertex at index i in A[1. n] · S = A[1] => Distance [1] = 0 · Initialize all element in Distance array to - or (except the) Distance [1] · For i < 1 to n ; Distance [vi] = max Distance [vi], distance [vi]+ l(vi, vi)} For each v; & Out (vi)} Note: Elvi, vi) is length of edge (vi, vi) This algorithm takes O(m+n). because doing DFS(s) take O(m+n) To pological sort take O(m+n) and the loop take O(n)

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(O(n)

while (VI= sinker):

Print (V);

V= Successor [V]

Worst case running time is O(n+m)

4 2D 30 / 30

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