

Analysis of Algorithms
CS 375, Spring 2020

Homework: Graphs

Due by 11:59pm Anywhere on Earth, **DATE TBD**

- To submit this HW, please email a PDF named `HW_Graphs_<yourName>` to `eaaron@colby.edu`.
- **READING:** From your textbook (CLRS), please read Chapters 22.1–22.3.

Exercises

1. CLRS 22.1-2 (pg. 592). A lengthy explanation is not necessary; it is sufficient to present a matrix, a list of lists, and enough detail to make sure a reader can understand how they correctly represent the tree. **Note:** A *complete binary tree* is one in which every level is filled in, left to right; for example, a complete binary tree with 7 vertices has every possible node on three levels. As a default—and for this exercise in particular—edges in trees are considered to be undirected. (See pg. 1179 for a definition of a complete tree.)
2. CLRS 22.2-2 (pg. 601). Give your answer by presenting a table of the following form, with the values for discovery time and predecessor filled in for each vertex; no further explanation is necessary for this exercise.

vertex	discovery time (field .d)	π
r		
s		
t		
u		
v		
w		
x		
y		

3. Show how depth-first search works on the graph of Figure 22.6 in CLRS by showing the resulting discovery time, finishing time, and π values. Similar to the above exercise, give your answer by presenting a table of the following form; no further explanation is needed for this exercise.

vertex	discovery time (field .d)	finishing time (field .f)	π
q			
r			
s			
t			
u			
v			
w			
x			
y			
z			

Assume that the **for** loop of lines 5–7 of the DFS procedure considers the vertices in alphabetical order. Furthermore, assume that the graph has an adjacency list representation, and assume that each adjacency list is ordered alphabetically.