CS300 – Spring 2018-2019 - Sabancı University

Homework #5 – Trace Operations on Graph

Due Date: May 24 Friday 23:55

Brief Description

In this homework, there are several trace operation questions. You are provided with graphs and you are expected to show the tracing operations step by step on given graph.

The solution papers should be typeset using Word, Scientific Workplace, LATEX, etc., and any figures should be drawn using some kind of a drawing tool such as PowerPoint, Visio, etc. HOWEVER YOUR SOLUTIONS SHOULD BE SUBMITTED IN ONLY .pdf FORMAT. NO HAND-WRITTEN SOLUTIONS WILL BE ACCEPTED. Make sure what is submitted can be properly printed, otherwise they will not be considered.

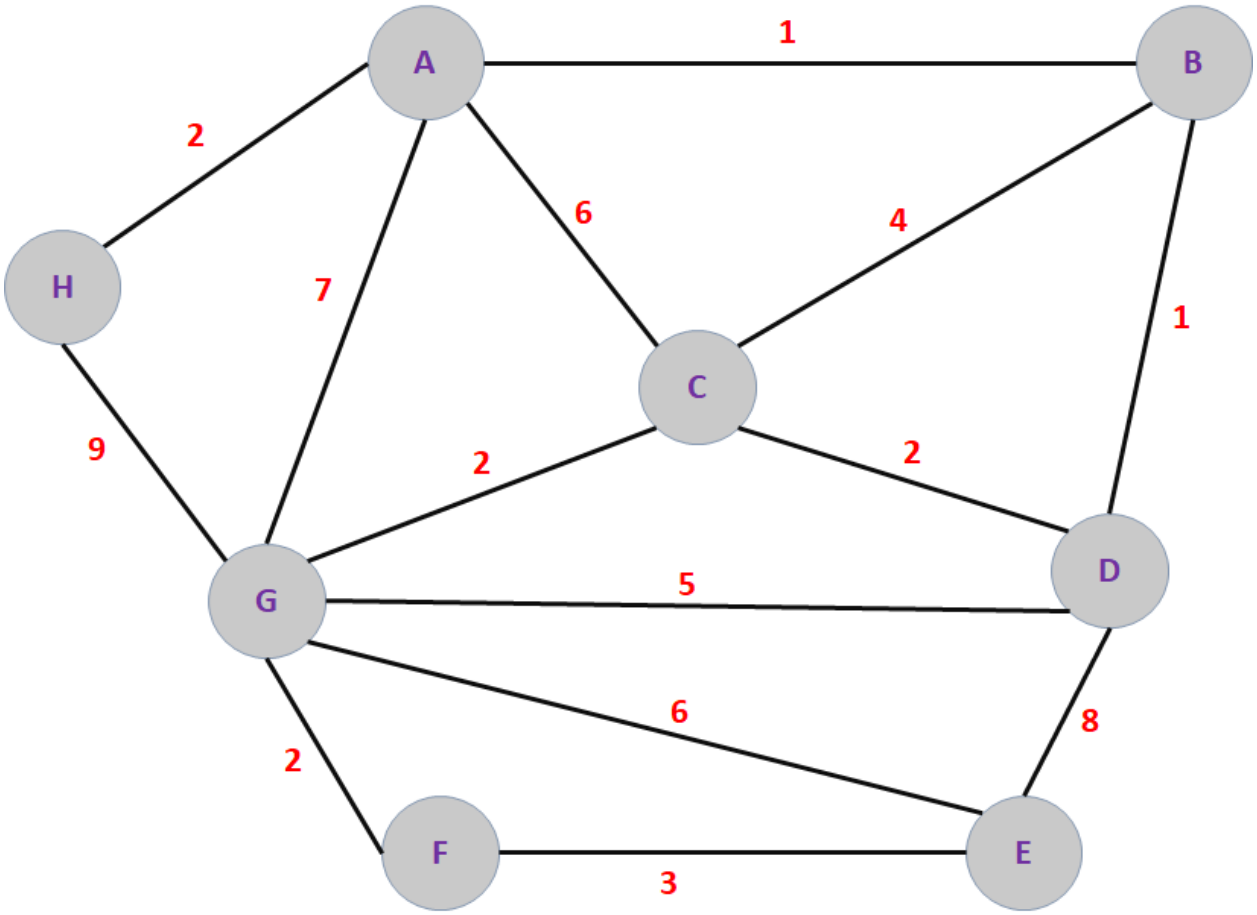

Figure 1

Question 1

Starting from G, trace the operations of the Dijkstra's weighted shortest path algorithm on the graph given in *Figure 1*.

Question 2

Starting from G, trace the operations of the Prim's minimum spanning tree algorithm on the graph given in *Figure 1*.

Question 3

Trace the operations of Kruskal's minimum spanning tree algorithm on the graph given in *Figure 1*.

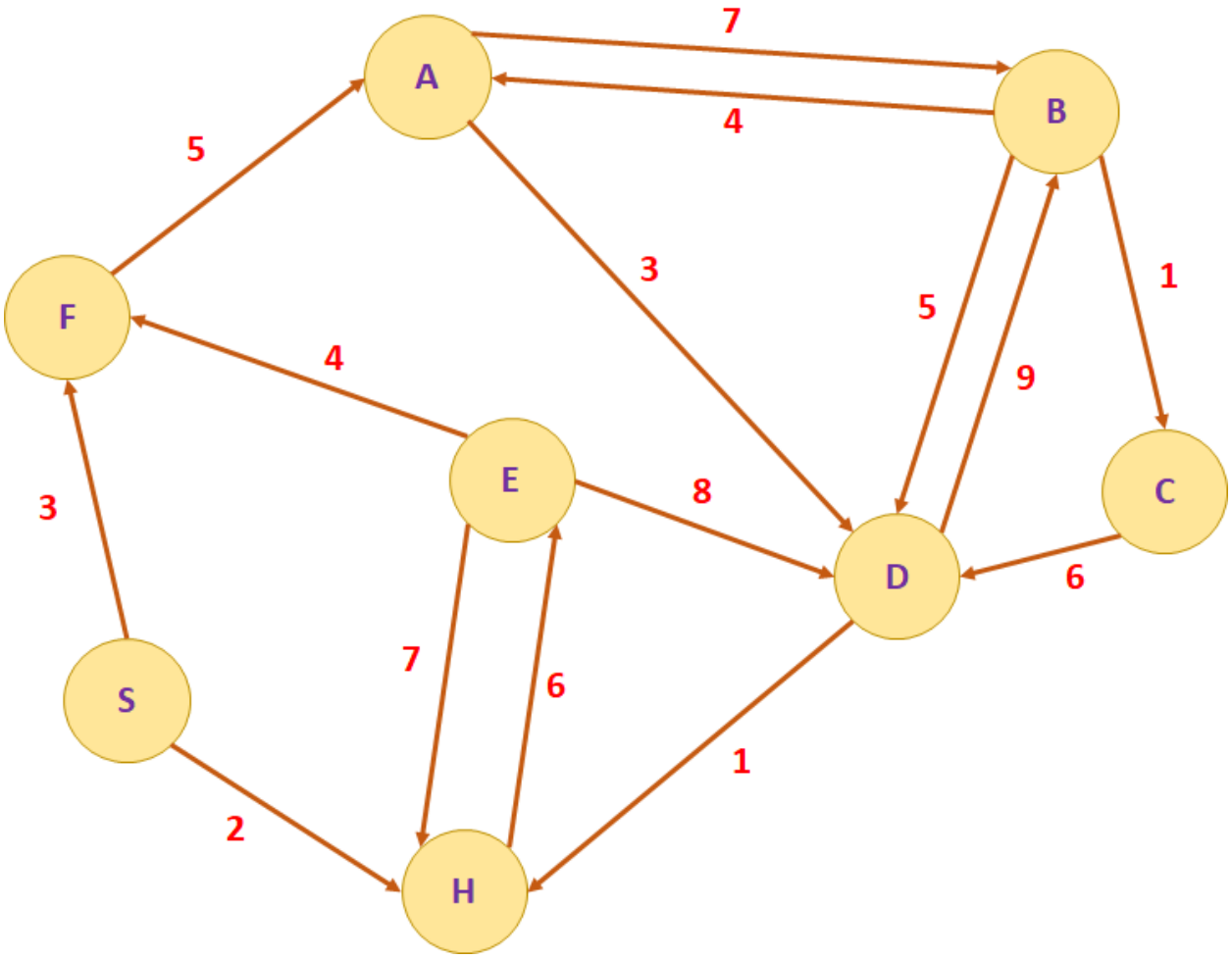

Figure 2

Question 4

Starting from S, trace the operations of breadth-first traversal on the graph given in *Figure 2*. (You can think that graph is unweighted for this question.)

Question 5

Given *Figure 2* and starting from S,

a) Trace the operations of depth-first traversal.

b) Give the post-order numbers for all the nodes.

c) Give the pre-order numbers for all the nodes.

d) List the tree arcs, cross arcs, forward arcs, and backward arcs.

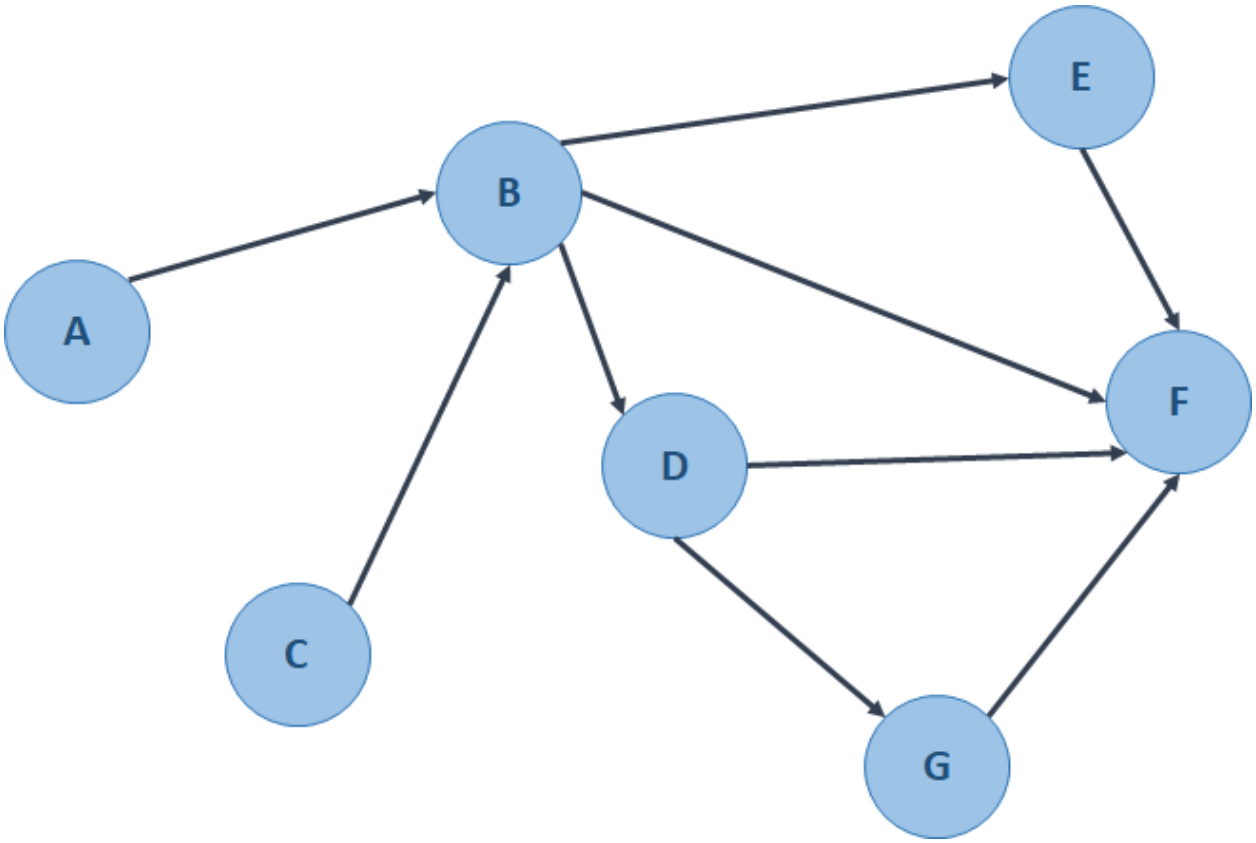

Figure 3

Question 6

Find a topological ordering of the graph given in *Figure 3*.

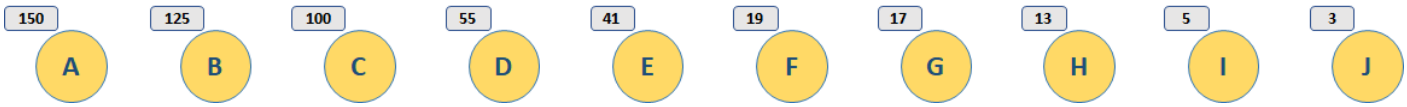

Figure 4

Question 7

Apply Huffman Coding Algorithm to *Figure 4*. Indicate each letters prefix values.

General Rules and Guidelines about Homeworks

The following rules and guidelines will be applicable to all homeworks, unless otherwise noted.

How to get help?

You may ask questions to TAs (Teaching Assistants) of CS300. Office hours of TAs are at the syllabus. Recitations will partially be dedicated to clarify the issues related to homework, so it is to your benefit to attend recitations.

What and Where to Submit

Please see the detailed instructions below/in the next page. The submission steps will get natural/easy for later homeworks.

Grading and Objections

Careful about the semi-automatic grading: Your programs will be graded using a semi-automated system. Therefore, you should follow the guidelines about input and output order; moreover, you should also use same prompts as given in the Sample Runs. Otherwise semi-automated grading process will fail for your homework, and you may get a zero, or in the best scenario you will lose points.

Grading:

- Late penalty is 10% off the full grade and only one late day is allowed.
- **Having a correct program is necessary, but not sufficient to get the full grade. Comments, indentation, meaningful and understandable identifier names, informative introduction and prompts, and especially proper use of required functions, unnecessarily long program (which is bad) and unnecessary code duplications will also affect your grade.**
- Please submit your own work only (even if it is not working). It is really easy to find out "similar" programs!
- For detailed rules and course policy on plagiarism, please check out http://myweb.sabanciuniv.edu/gulsend/courses/cs201/plagiarism/

Plagiarism will not be tolerated!

Grade announcements: Grades will be posted in SUCourse, and you will get an Announcement at the same time. You will find the grading policy and test cases in that announcement.

Grade objections: It is your right to object to your grade if you think there is a problem, but before making an objection please try the steps below and if you still think there is a problem, contact the TA that graded your homework from the email address provided in the comment section of your announced homework grade or attend the specified objection hour in your grade announcement.

- Check the comment section in the homework tab to see the problem with your homework.
- Download the .zip file you submitted to SUCourse and try to compile it.
- Check the test cases in the announcement and try them with your code.
- Compare your results with the given results in the announcement.

What and where to submit (IMPORTANT)

Submissions guidelines are below. Most parts of the grading process are automatic. Students are expected to strictly follow these guidelines in order to have a smooth grading process. If you do not follow these guidelines, depending on the severity of the problem created during the grading process, 5 or more penalty points are to be deducted from the grade.

Add your name to the program: It is a good practice to write your name and last name somewhere in the beginning program (as a comment line of course).

Name your submission file:

- Use only English alphabet letters, digits or underscore in the file names. Do not use blank, Turkish characters or any other special symbols or characters.
- Name your cpp file that contains your program as follows.

  "SUCourseUserName_yourLastname_yourName_HWnumber.cpp"
- Your SUCourse user name is actually your SUNet user name which is used for checking sabanciuniv e-mails. Do NOT use any spaces, non-ASCII and Turkish characters in the file name. For example, if your SUCourse user name is cago, name is Çağlayan, and last name is Özbugsızkodyazaroğlu, then the file name must be:

  cago_ozbugsizkodyazaroglu_caglayan_hw4.pdf
- Do not add any other character or phrase to the file name.
- Make sure that this file is the latest version of your homework program.

Submission:

- Submit via SUCourse ONLY! You will receive no credits if you submit by other means (e-mail, paper, etc.).
  1. Click on "Assignments" at CS300 SUCourse.
  2. Click Homework 5 in the assignments list.
  3. Click on "Add Attachments" button.
  4. Click on "Browse" button and select the pdf file that you generated.
  5. Now, you have to see your pdf file in the "Items to attach" list.
  6. Click on "Continue" button.
  7. Click on "Submit" button. We cannot see your homework if you do not perform this step even if you upload your file.

Resubmission:

- After submission, you will be able to take your homework back and resubmit. In order to resubmit, follow the following steps.
  1. Click on "Assignments" at CS300 SUCourse.
  2. Click Homework 5 in the assignments list.
  3. Click on "Re-submit" button.
  4. Click on "Add/remove Attachments" button

5. Remove the existing pdf file by clicking on "remove" link. This step is very important. If you don't delete the old pdf file, we get both files and the old one may be graded.
6. Click on "Browse" button and select the new pdf file that you want to resubmit.
7. Now, you have to see your new pdf file in the "Items to attach" list.
8. Click on "Continue" button.
9. Click on "Submit" button. We cannot see your homework if you do not perform this step even if you upload your file.

Successful submission is one of the requirements of the homework. If, for some reason, you cannot successfully submit your homework and we cannot grade it, your grade will be 0.

Good Luck!
Mahmut Yasir Esmek and Gülşen Demiröz