

Grade FZ (taken from IE102 Syllabus) – You have to hand in all the homework. Otherwise, you receive an FZ.

IE102 Fall 2019 Homework VII- Due: 16 December, Monday until 10:30 am.

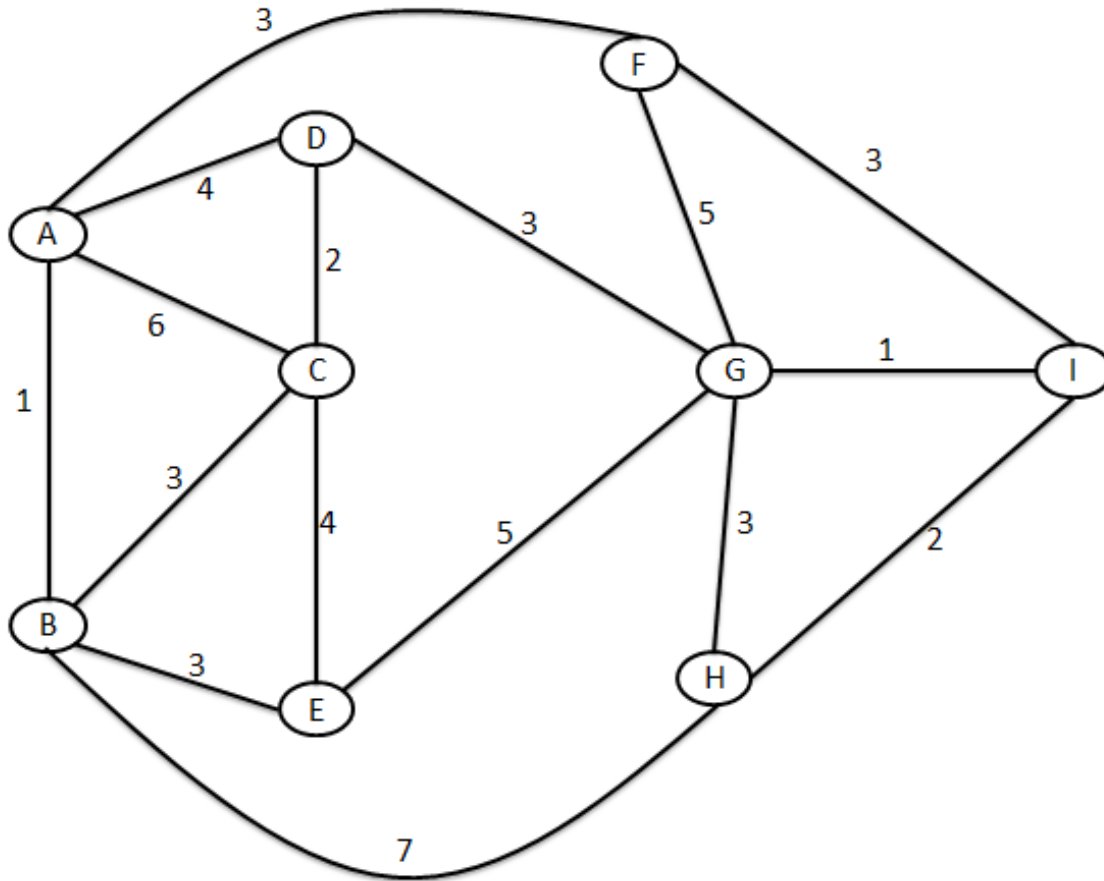
IMPORTANT: READ BEFORE YOU START WORKING ON THE HOMEWORK

Information on Homework VII

- Homework IV is 1% Make sure that you review course material before you start. Cite sources used if any.
- Homework assignment will be conducted in groups of 2. We randomly form the groups. You can find your group member and his/her contact information in the e-mail. **If you cannot reach your group member by all means, indicate this on the cover page of your submission.**
- Grading Policy: The grading scale for each question is 2 points (correct), 1 point (partially correct), and 0 (no effort or no submission).
- Academic Dishonesty (taken from IE102 Course Information): **Academic misconduct is not tolerated, and violations will be treated in accordance with the university policy.** For assignments: Discussion of the course material and working in groups are effective ways of learning. However, this does not mean that you can copy the assignment from one of your friends. You can discuss with your friends, but you should be alone, without any written solution in front of you, when you actually prepare your assignment. It is extremely important to understand the value of this exercise in the process of learning. Any violation of the above understanding will result measures outlined in the student rules and regulations.
- Submission Information: An assignment submission box will be placed in front of office EA305 on the morning of the submission date and will be removed at the time of the deadline. You need to put your assignment in the designated box before the submission deadline. **Submission via e-mail is NOT accepted.**

Contact TA Çağla Dursunoğlu if you have questions related to this HW:
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Question 1: Central City is going to establish new fire stations. It is known that there are 9 major districts in the city (A...I). The exact locations of these districts are shown on the graph below, along with the travel time values between pairs (in minutes). The stations can only be located on the nodes {A, B, C, G, H, I}.



- a) Construct the travel time matrix.
- b) What are the optimal fire station locations if we want to minimize the total time of reaching every district while locating two stations.
- c) What is the minimum allowable time to cover every district in the shortest possible time using a single station? (i.e. indicate the minimum time that every city is reachable by a station) On which location(s) should the fire station be located at in order to obtain this minimum time?
- d) Suppose that the allowable time is 4 minutes for full-coverage.
 - i. Find the feasible solutions with two stations. Please indicate all the combinations satisfying the full-coverage of the city.
 - ii. In order to evaluate each feasible location combination, find the values for the following criteria.
 - Total of time reaching every district
 - The worst time of reaching a district
 - Number of twice covered districts
 - iii. Scale the values you found on the previous part to common units. The range of each criterion should be between the minimum and maximum values found in part ii.

- iv.** Suppose that the weight of each criterion is as shown below. List the location combinations in preference order according to their total scores.
- Total sum of time reaching each district: 0.2
 - The worst time of reaching a district: 0.3
 - Number of twice covered districts: 0.5