Middle East Technical University | Department of Computer Engineering

CENG 223

Discrete Computational Structures

Fall '2017-2018

Homework 5

Due date: 8 January 2018, 23:55

Question 1

What is the largest possible number of vertices in a graph with 23 edges all vertices having degree at least 4?

Question 2

Suppose G is a graph with n vertices, each of which has degree $d \geq \frac{n-1}{2}$. Prove that G contains a Hamiltonian path.
Hint: Dirac's theorem

Question 3

Let A be the adjacency matrix of a bipartite graph. Prove that the diagonal entries of A^{37} are equal to 0.

Question 4

Show your work for both algorithms as in the textbook, i.e. give the table with columns Choice-Edge-Weight, displaying your choice at each step. Draw the minimum spanning tree you obtained.

a. Use Kruskal's algorithm to find a minimum spanning tree for the given graph.

b. Use Prim's algorithm to find a minimum spanning tree for the given graph.

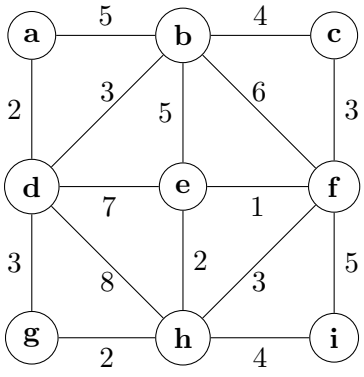

Figure 1: Q4

1 Regulations

1. You have to write your answers to the provided sections of the template answer file given. Other than that, you cannot change the provided template answer file. If a latex structure you want to use cannot be compiled with the included packages in the template file, that means you should not use it.
2. Do not write any other stuff, e.g. question definitions, to answers' sections. Only write your answers. Otherwise, you will get 0 from that question.
3. **Late Submission: Not allowed**
4. **Cheating: We have zero tolerance policy for cheating**. People involved in cheating will be punished according to the university regulations.
5. **Newsgroup:** You must follow the newsgroup (news.ceng.metu.edu.tr) for discussions and possible updates on a daily basis.
6. **Evaluation:** Your latex file will be converted to pdf and evaluated by course assistants. The .tex file will be checked for plagiarism automatically using "black-box" technique and manually by assistants, so make sure to obey the specifications.

2 Submission

Submission will be done via COW. Download the given template file, "hw5.tex", when you finish your exam upload the .tex file with the same name to COW.
Note: You cannot submit any other files. Don't forget to make sure your .tex file is successfully compiled in Inek machines using the command below.

```
$ pdflatex hw5.tex
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