

Graph Theory - MATH 247

Exam 2 - Part 1

November 11, 2019

Name:

Honor Code Pledge:

Signature:

Directions: Please complete three out of four problems – each is worth 10 points. There is a time limit of 1 hour.

1. Apply Dijkstra's algorithm to obtain the distance from vertex a to each of the other vertices in the graph in Figure 1. Please show the list of "tentative distances" for each vertex in a tabular format.
2. Characterize when K_{n_1, \dots, n_p} is Hamiltonian. Characterize when K_{n_1, \dots, n_p} has a Hamiltonian path.
3. A drawing of the De Bruijn graph D_4 is given below in Figure 2. An *independent set* in a graph G is a set of vertices no two of which are adjacent. The maximum size of an independent set in D_4 is 3. One such maximum size independent set is the set of vertices $\{000, 010, 111\}$. (There are other independent sets of size 3 as well.). Find the maximum size of an independent set in D_5 . (You need not draw D_5 but you may find it helpful.)
4. A graph G of order $n \geq 4$ has $\deg(v) \geq (n + 1)/2$ for each vertex v of G . Is $G - v$ Hamiltonian?

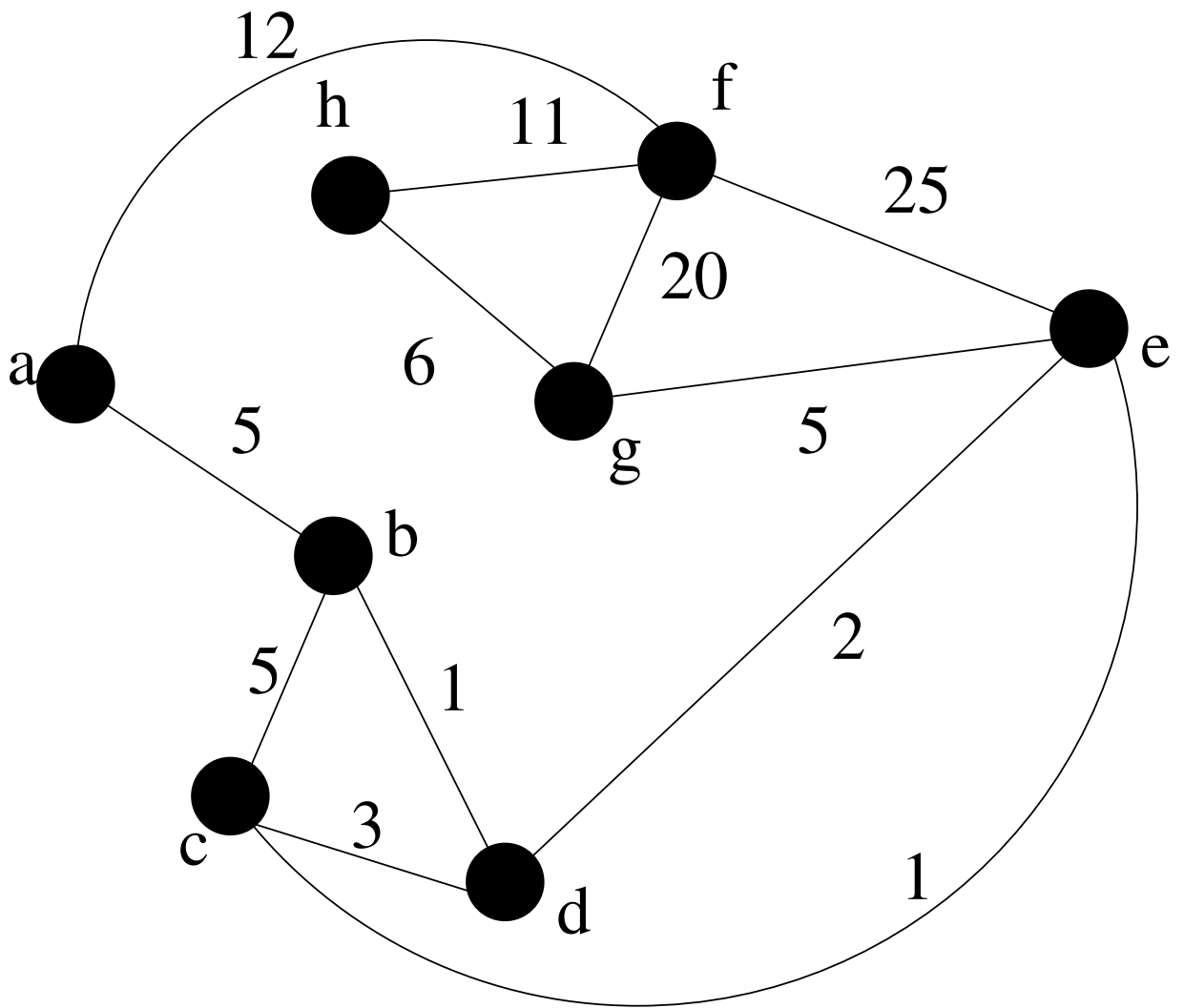


Figure 1: A graph, G

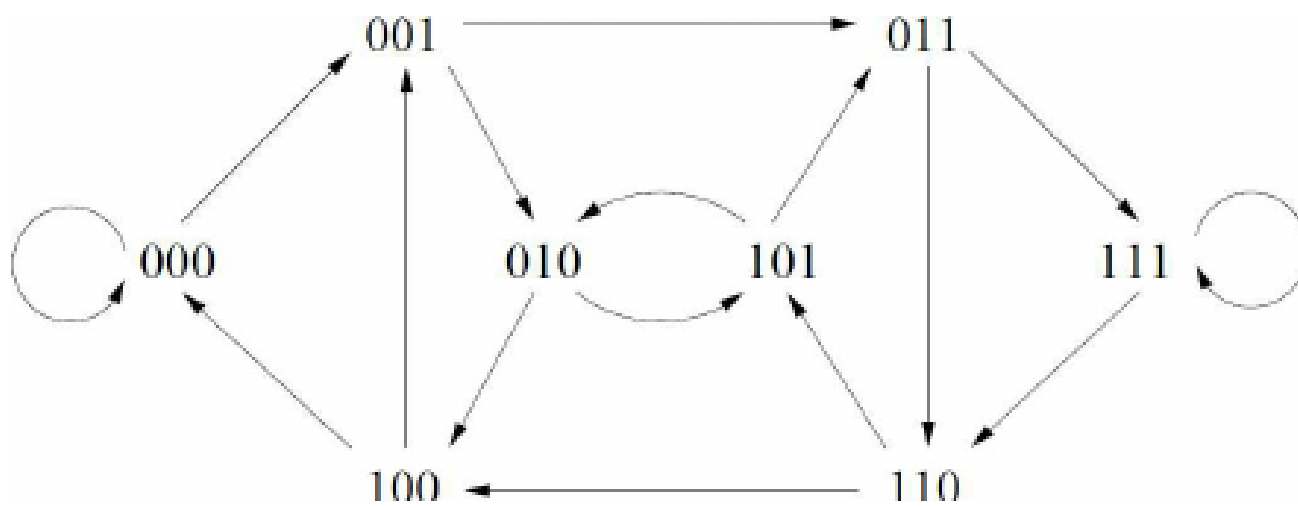


Figure 2: The DeBruijn graph D_4