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CPTS 453

Graph Theory

11-20-2019

Homework 6

1.

Let G be a K-regular graph and let D be a degree matrix so that

Then let D be a scalar matrix with all diagonal entries, k. Then let suppose x is an Eigen vector which corresponds to the Eigen value d of A which is

Then suppose we have the Laplacian matrix

Then we have

Note that

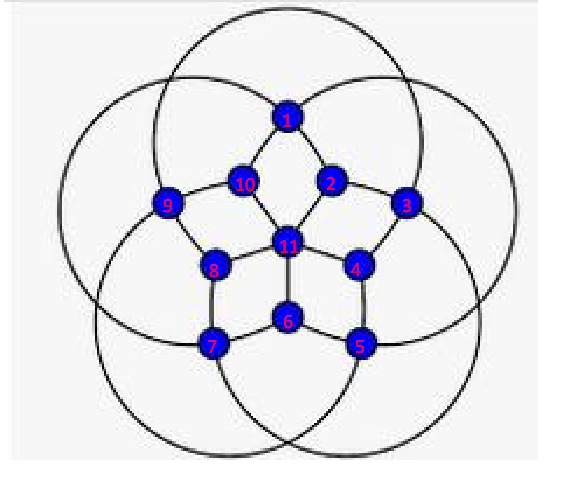
And

Because we let D be a scalar matrix with all diagonals being equal to k.

Therefore x is an Eigen vector of L that corresponds to the Eigen value

Then we can see that

2.

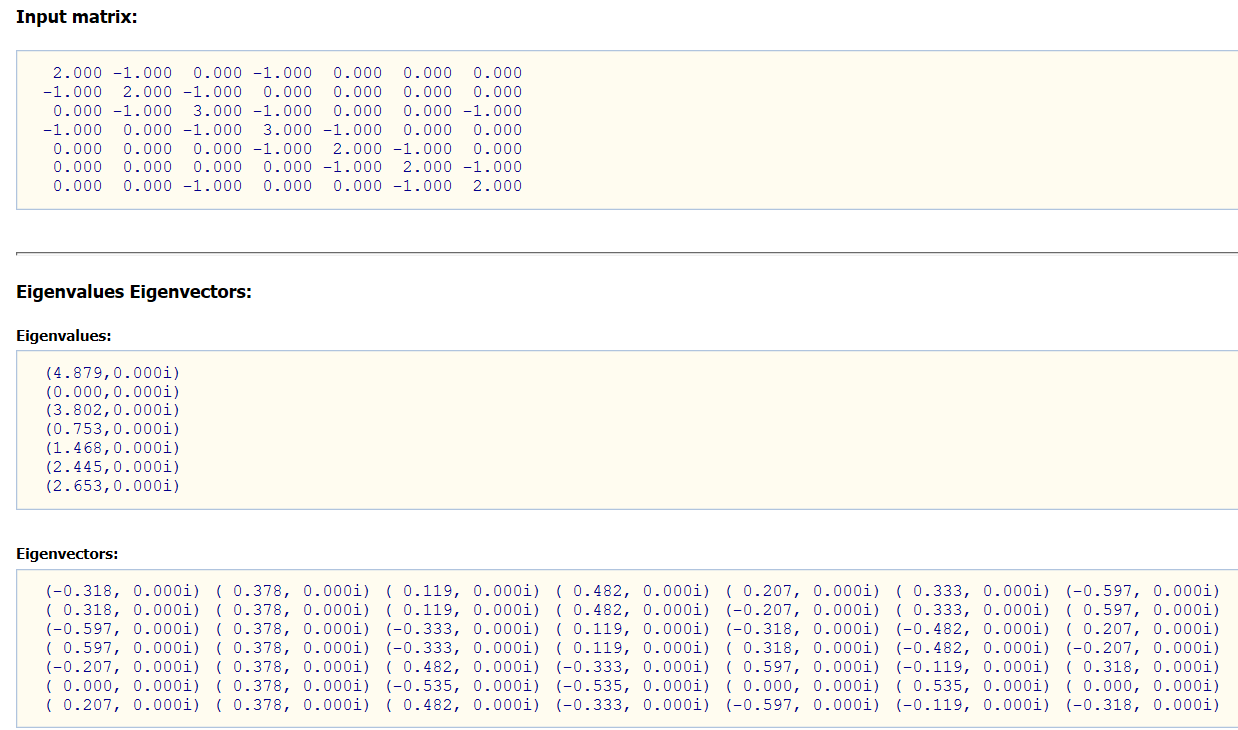


Laplacian Matrix:

D is the Degree Matrix and A is the Adjacency Matrix

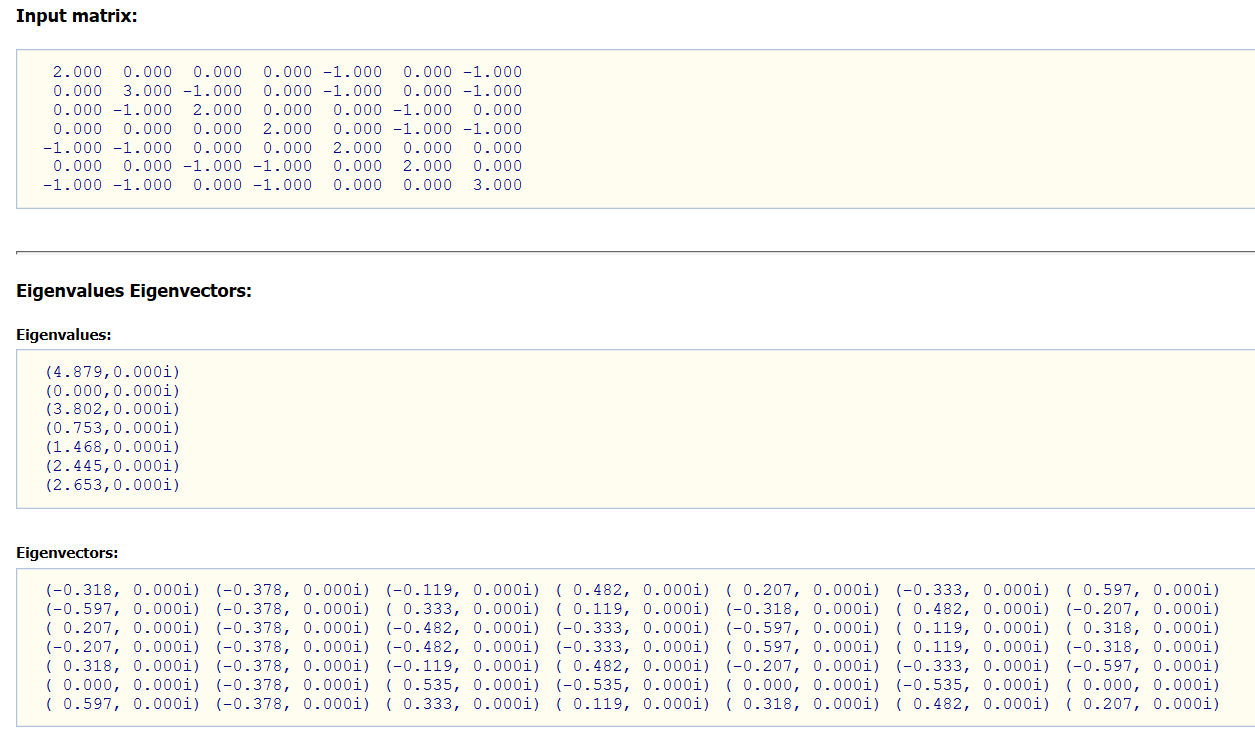
3.

A)

<http://bluebit.gr/matrix-calculator/>

Equal

Graph A

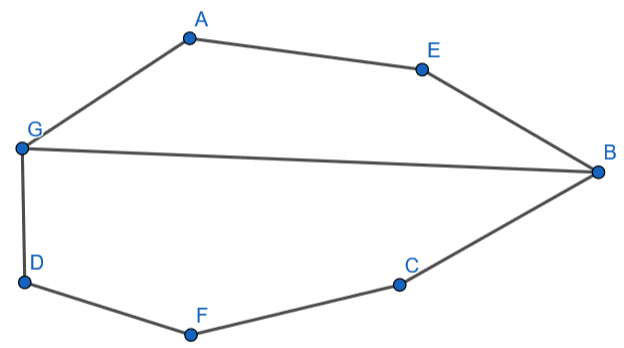
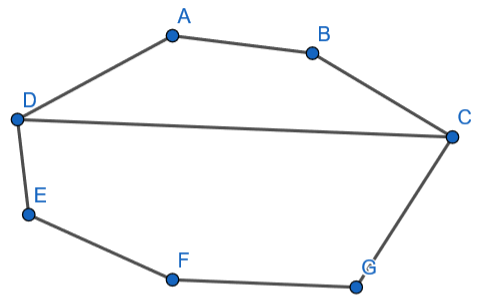


Graph B

B)

Graph B

Graph A



To check whether or not graph A and graph B are isomorphic we need to check the degree of every vertex on both graphs. Both graphs have 7 vertices.

**Degrees for Graph A**

**Degrees for Graph B**

**Match Vertices of Graph A and Graph B**

, ,

Incidence relation is preserved and therefore graph A and graph B are in fact isomorphic.

4.

Since it’s a path we know that the adjacency matrix number of ones in symmetric positions is 2n. Since this is true then it is known that the adjacency matrix of the path

First we have

This shows that