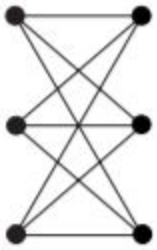
MAT 118 Spring 2017

Practice Exam for Midterm #2

To be reviewed in class on Monday, 4/17/17

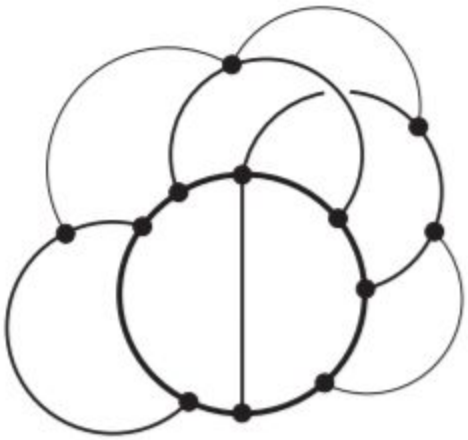
1. Consider the following graph:



(a) Write the degrees of the vertices on the graph.
(b) Does this graph have any Euler circuits? Why or why not?
(c) Does this graph have any Euler paths? Why or why not?
(d) Give an optimal Eulerization of the graph. How many edges did you add?

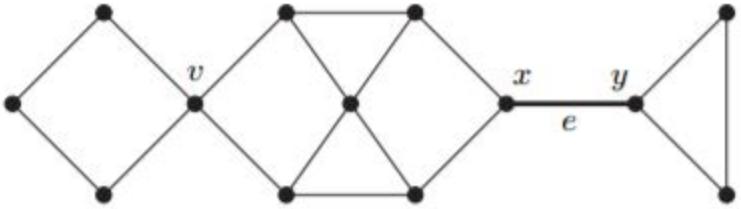
2. (a) Give an example of a connected graph with 6 vertices, each vertex of degree 2.
(b) Give an example of a graph with 6 vertices, each vertex of degree 1.

3. Consider the following graph:



(e) Write the degrees of the vertices on the graph.
(f) Does this graph have any Euler circuits? Why or why not?
(g) Does this graph have any Euler paths? Why or why not?
(h) Give an Eulerization of the graph.

4. Consider the following graph:

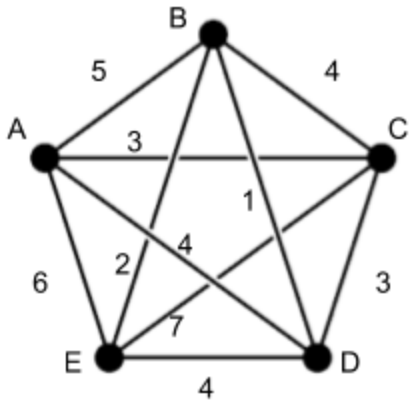


(a) Find a path from v to y of length 6.
(b) Find all circuits in the graph of length 4. How many are there?
(c) Semi-eulerize the graph, leaving x and y as the two distinguished odd vertices.

5. For each of the following, if your answer is "yes" then draw an example, and if your answer is "no" then give a brief explanation.

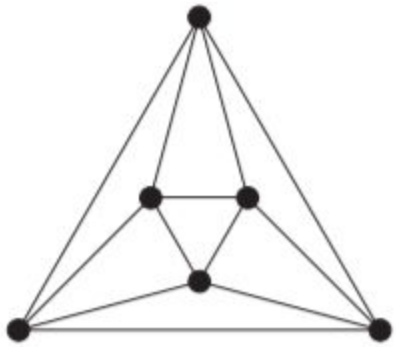
(a) Does the graph in problem #4 have any Hamilton circuits?
(b) Does the graph in problem #4 have any Hamilton paths?

6. Consider the following weighted graph:

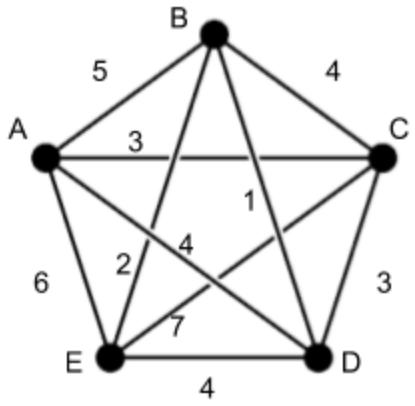


(a) Using the NNA starting at A, give the resulting Hamilton circuit and its total weight.
(b) Using the NNA starting at B, give the resulting Hamilton circuit and its total weight.
(c) Using the Cheapest link algorithm, give the resulting Hamilton circuit and its total weight.

7. For the following graph, produce 3 different spanning trees.



8. For the weighted graph in problem #6, reproduced below, use Kruskal's algorithm to find an MST, and give its total weight.



9. (a) How many spanning trees does the following graph have?
(b) If each edge has weight 3, what's the total weight of an MST?