AMAT 3240 – Test #1

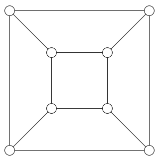
Fall 1999

Name: ____________________

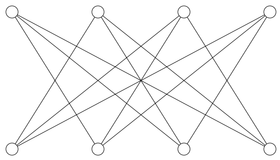
Instructions:

- This test has 7 questions, appearing on 4 pages.
- Answer each question completely; justify your answers.
- You have 60 minutes to finish.

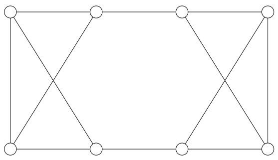
1. Consider the following graphs. For each pair of graphs, either find an isomorphism between them or prove that none exists.



G_1

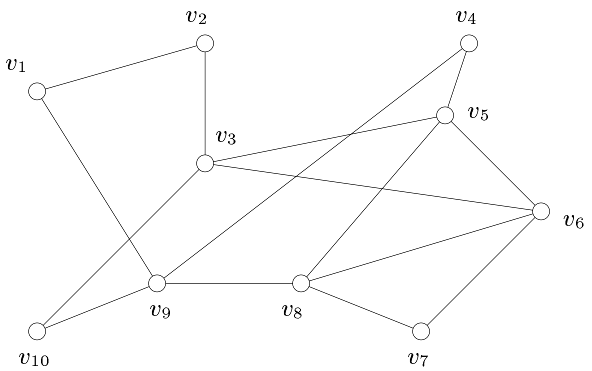


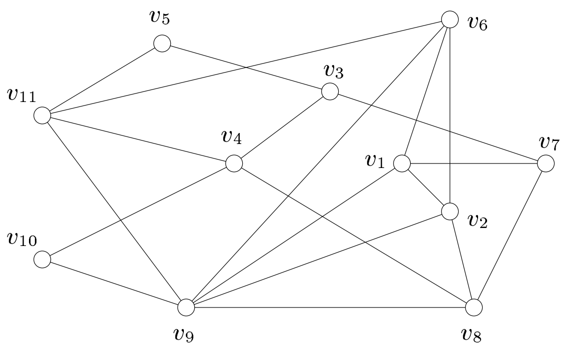
G_2



G_3

2. For each of the following graphs, either construct an Eulerian circuit or else explain why none exists.



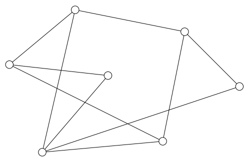


3. For each of the following degree sequences, either construct a graph with the degree sequence or else prove that none exists.

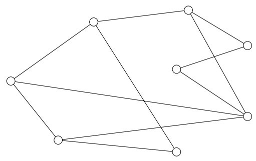
   (a) 5,4,3,3,2,2,1,0

   (b) 4,4,3,3,2,2,1,1,1

4. For each of the following graphs, either find a bipartition of its vertices, or else explain why none exists.



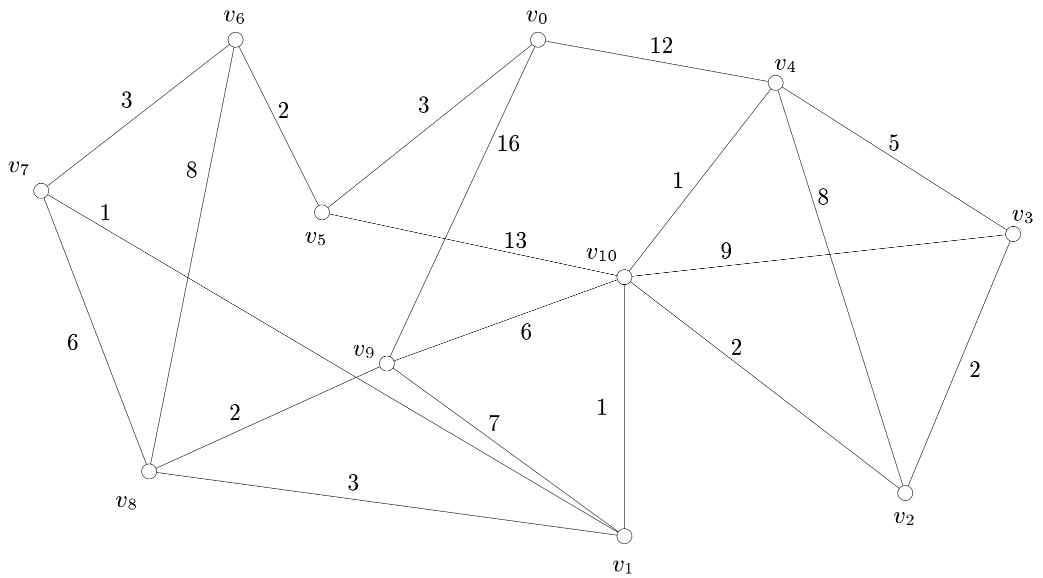
G_1



G_3

5. Suppose $m \geq 1$. Does $K_{m,m+1}$ contain a Hamiltonian path? Justify your answer.

6. Find a least-weight path from vertex v_0 to each other vertex in the following graph. Indicate the weight of each such path.



7. For the following digraph:

   (a) Construct a canonical ordering of its vertices.

   (b) Find a least-weight path from vertex v_0 in your canonical ordering to each other vertex. Indicate the weight of each such path.