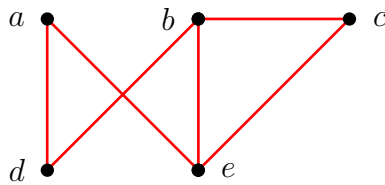Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 5 points.

Section 10.4 Connectivity

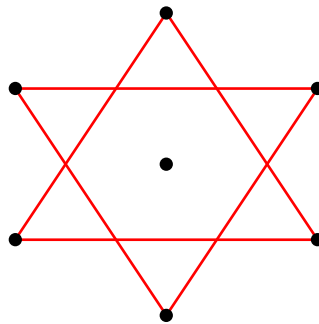**(1)** For this graph

decide which of these lists of vertices form a path. Is the path simple? Is it a circuit? Also give its length.

(a) a, e, b, c, b

(b) d, a, c, b, e

**(c)** e, a, d, b, e, c, b, d

(d) c, b, d, a, e, c

(2) How many connected components does this graph with 7 vertices have?

(3) As we saw, the Hollywood graph has actors for its vertices. Two actors are connected by an edge if they have appeared in the same film. If an actor has a vertex in the same connected component as Samuel L. Jackson, what does that mean?

[Hint: it does not necessarily mean they have been in a film with Samuel L.]

(4) (a) Write down the adjacency matrix for the graph K_4.

(b) Find the second power of this matrix and use it to compute the number of paths of length 2 between any two different vertices of K_4.

(c) Find the third power of the adjacency matrix and use it to compute the number of paths of length 3 between any two different vertices of K_4.

(5) Use paths to show these graphs G and H are or are not isomorphic.
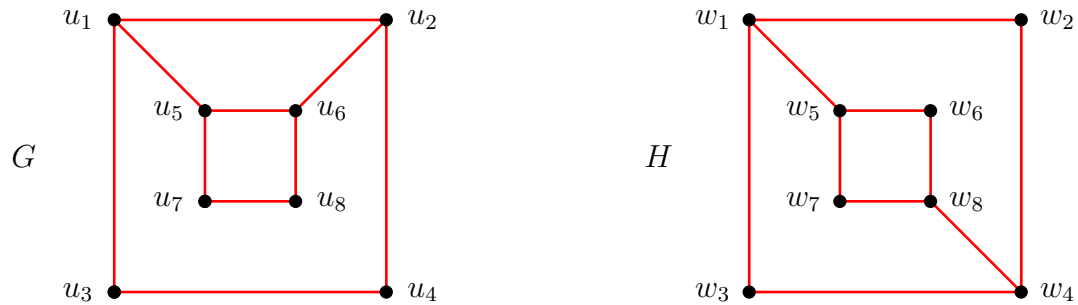
If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes or section in the textbook.

- Ask me about it after class.

- Come to my office hours: Mon 2:00 - 3:00, Wed 2:00 - 3:00 in CP 317.

- Go to the Math Tutorial Lab in-person in CP 303 or online.