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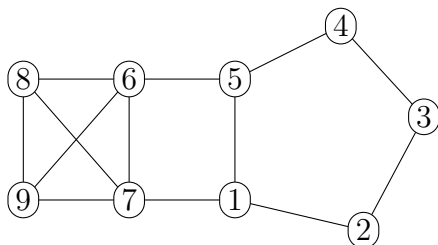
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Lecture: A B

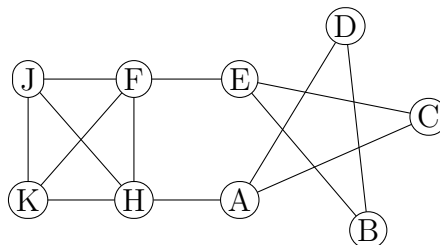
Discussion: Thursday Friday 9 10 11 12 1 2 3 4 5 6

1. (10 points) Are graphs X and Y (below) isomorphic? Justify your answer.

Graph X



Graph Y



2. (5 points) Use the pigeonhole principle to briefly explain why a graph with n nodes ($n \geq 2$) must have two nodes with the same degree. Hint: if one node has degree 0, what is the maximum degree of any other node? How many possible degree values are there?

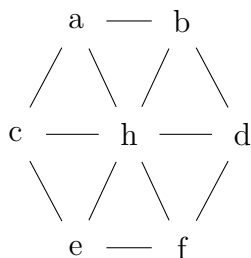
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1. (10 points) How many isomorphisms are there from G (below) to itself? Justify your answer and/or show your work clearly .



2. (5 points) Complete this statement of the Handshaking Theorem.

For any graph G with set of nodes V and set of edges E , ...

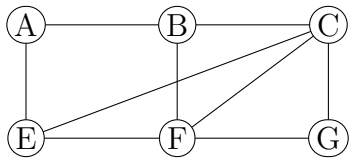
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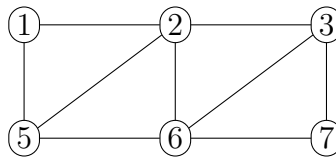
Discussion: Thursday Friday 9 10 11 12 1 2 3 4 5 6

1. (10 points) Are graphs X and Y (below) isomorphic? Justify your answer.

Graph X



Graph Y



2. (5 points) Show three distinct (i.e. not isomorphic) graphs, each of which has five nodes, three edges, and no cycles.

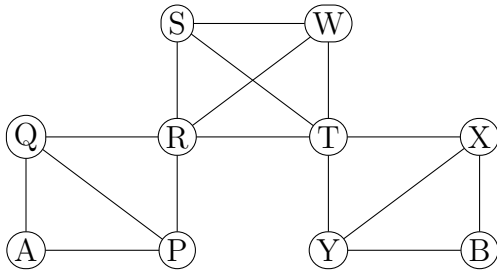
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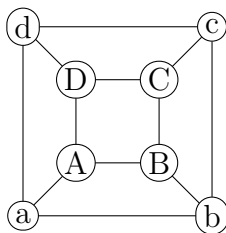
Lecture: A B

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1. (10 points) How many isomorphisms are there from G (below) to itself? Justify your answer and/or show your work clearly .



2. (5 points) Is this graph bipartite? Briefly justify your answer.



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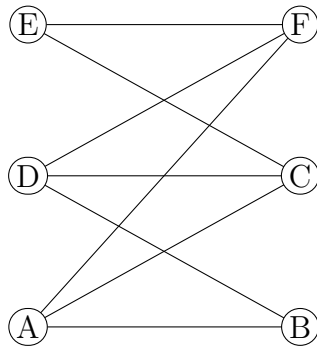
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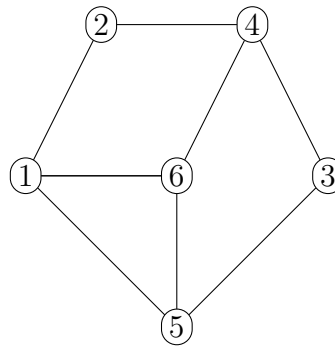
Discussion: Thursday Friday 9 10 11 12 1 2 3 4 5 6

1. (10 points) Are graphs X and Y (below) isomorphic? Justify your answer.

Graph X



Graph Y



2. (5 points) Does the complete graph K_8 have an Euler circuit? Briefly justify your answer.

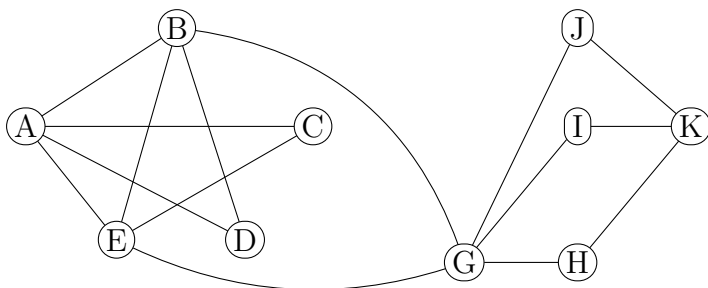
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1. (10 points) How many isomorphisms are there from G (below) to itself? Justify your answer and/or show your work clearly .



2. (5 points) If G is a graph, its complement G' has the same nodes as G but G' has an edge between nodes x and y if and only if G does not have an edge between x and y . Give a succinct high-level description of the complement of W_5 (5-cycle joined to a hub node). Briefly justify or show work.