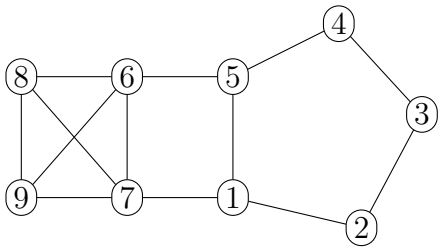
Name:_____

NetID:_____ **Lecture: A**

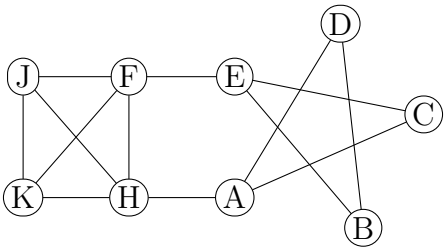
Discussion: Monday & Wednesday 1:30 2:30

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

Graph X



Graph Y



Solution: No, they are not isomorphic. Both graphs have three degree-2 nodes. In Graph X one degree-2 node (3) has neighbors that are both degree 2. In Graph Y, one of the degree-2 nodes (C) has only degree-3 neighbors.

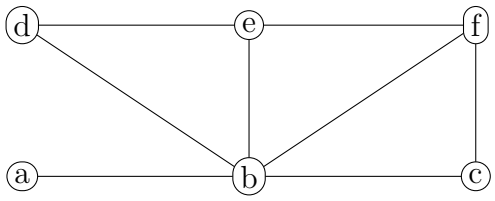
Alternatively, consider the two degree-3 nodes that are adjacent to a degree-2 node. In Graph X, these nodes (1 and 5) are adjacent. In Graph Y, these nodes (A and E) are not neighbors.

Alternatively, each graph contains a K_4 and a C_5 that don't overlap. Look at where the two connect. In Graph X, they connect at adjacent nodes. In graph Y, they connect at nodes that aren't neighbors.

2. (5 points) The degree sequence of a graph is the list of the degrees of all the nodes in the graph, arranged in numerical order, largest to smallest. Is it possible to construct a (simple) graph with degree sequence: 5, 3, 3, 2, 2, 1? Show how or briefly explain why this isn't possible.

Solution:

Yes. Here's a picture.



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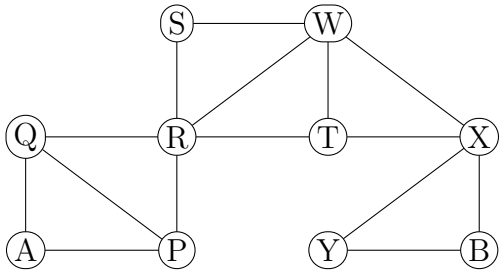
(9 points) How many paths are there from A to B in the graph below? Explain or show work.



Solution: There are four ways to get from A to R. Then there are six ways to get from R to X: RSWX, RSWTX, RWX, RWTX, RTWX, RTX. And then there are two ways to get from X to B. So there are a total of $4 \cdot 6 \cdot 2 = 48$ paths from A to B.

(2 points) Does the above graph have a cut edge?

Solution: No

(2 points) How many connected components does the above graph have?

Solution: One

(2 points) What is the diameter of the above graph?

Solution: Five