

Graph Theory Homework 3

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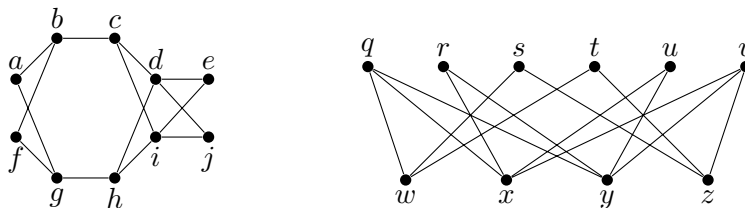
due Friday, February 18, 2022

1 Short answer

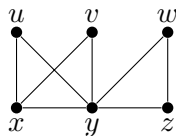
1. Up to isomorphism, there are four possible graphs with the degree sequence 3, 3, 2, 2, 2.

Find at least three of them, and find distinguishing properties to show that none of the graphs you found are isomorphic to each other.

2. Find an isomorphism between the two graphs below.



3. Find four spanning trees of the graph below: one with 2 leaves, one with 3 leaves, one with 4 leaves, and one with 5 leaves.



2 Proof

4. Prove by induction on d that the cube graph Q_d has $d \cdot 2^{d-1}$ edges.

There are direct proofs without the use of induction as well, but for this problem, I specifically want you to practice writing a proof by induction.

You have already written a rough draft of this problem. Now, write the final draft.

5. Let G be a connected graph with n vertices and exactly one cycle. Prove that G has n edges.

Write a rough draft of the solution. I will give you feedback, and you will write a final draft of your proof as part of Homework 4.