

# Discrete Math - Review for Exam II

Our second exam will be next Wednesday, November 2. Here are some sample problems focusing on graph theory. I'm sure there will also be a truth table and a summation proof by induction.

1. Problem 3, 4, 6, and 7 from section 4.1 of our textbook.
2. For the graph  $G$  shown in figure 1, write down:
  - (a) The order  $v$  of  $G$ ,
  - (b) The size  $e$  of  $G$ ,
  - (c) The degree sequence of  $G$ .
  - (d) Verify that the handshake lemma holds for  $G$ .
3. Figure 2 shows two isomorphic graphs of degree 5. Find an isomorphism between them by directly indicating which vertices match to which vertices.
4. Show, by example, that it's possible to have two non-isomorphic graphs, both with 5 vertices and 5 edges.
5. A graph has 10 vertices and 30 edges. Explain why it cannot be planar.
6. Verify Euler's identity for the Planar graph shown in figure 3.
7. Indicate how the greedy algorithm would color the graph shown in 4 by labelling each node with colors from the following ordered list of colors: R, Y, B, G, P.
8. Prove, by induction, that a tree always satisfies  $v = e + 1$ .
9. The McGee graph, shown in figure 5, has girth 7. Show that it is non-planar.

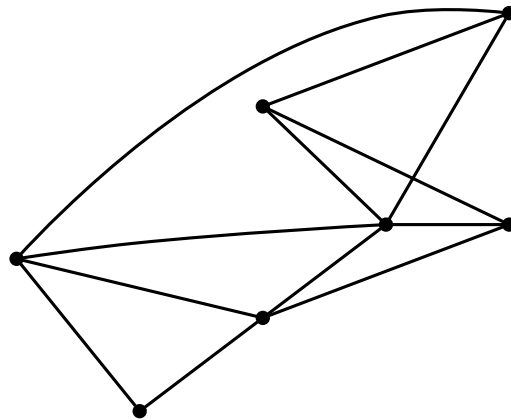


Figure 1: A Graph

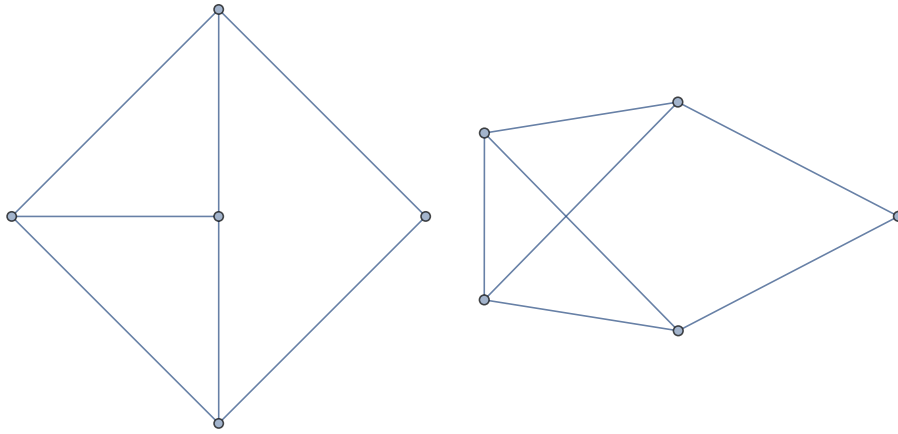


Figure 2: Two isomorphic graphs of order 5

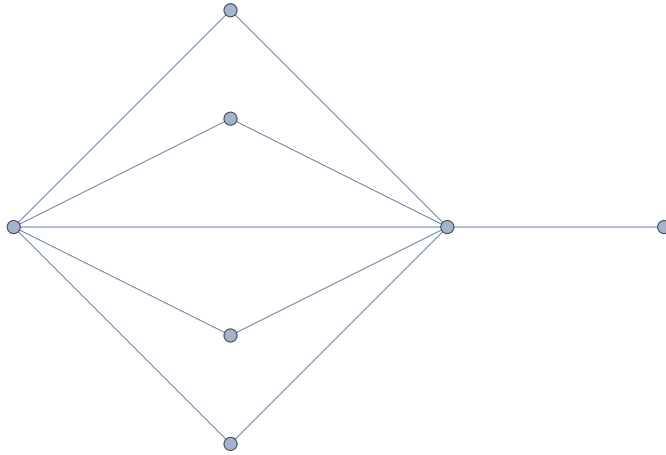


Figure 3: A planar graph

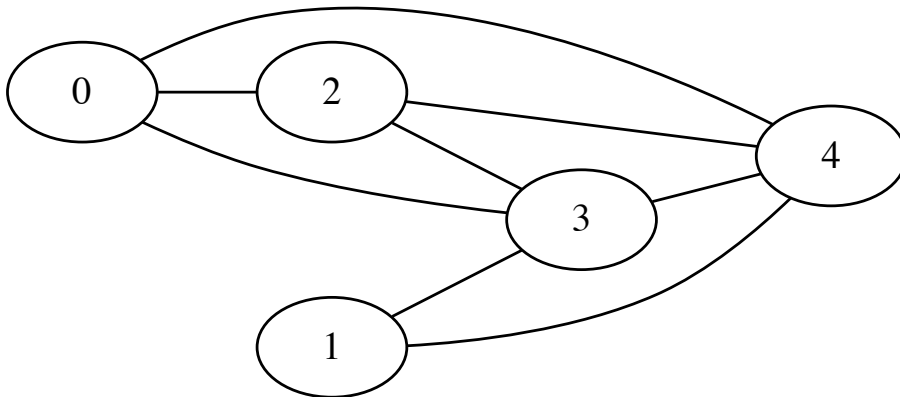


Figure 4: A graph for coloring

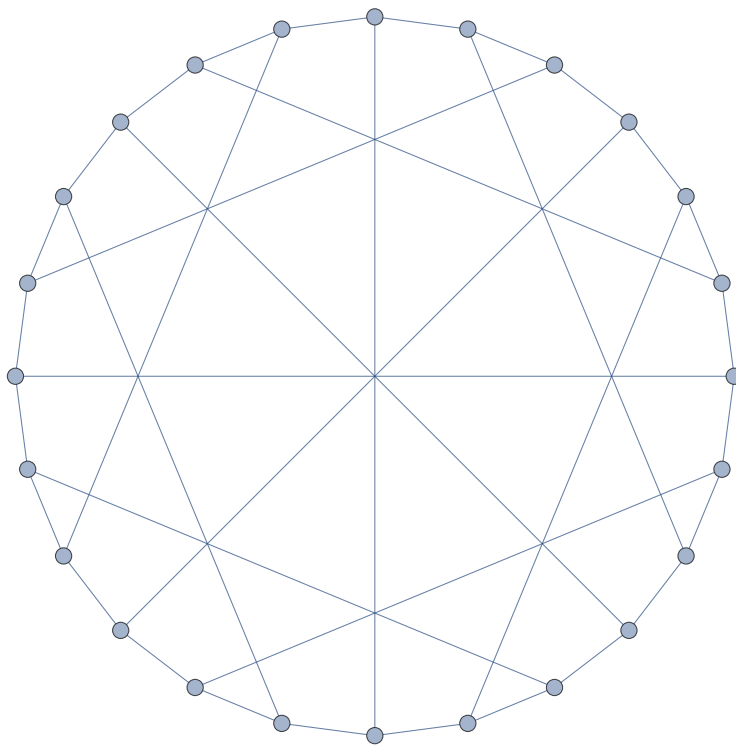


Figure 5: The McGee Graph