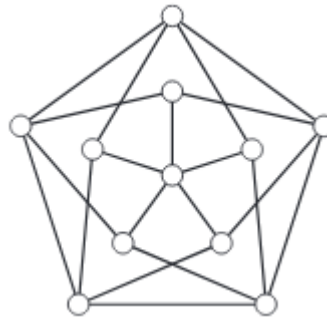# PILOT
Discrete Math
Problem-Set #12
Spring 2019

1. How many cut edges does a connected graph that's also a tree have?

2. For a graph on 6 vertices, find the amount of ways to form:

   Prove that a forest on n vertices with c connected components has exactly $n - c$ edges.

   (a) a connected graph with exactly 1 cycle.

   (b) a connected graph that's a tree.

   (c) a forest.

3.

4. Show that a graph G contains at least $|E(G)| - |V(G)| + 1$ cycles.

5. Prove that if graph G has n vertices, $\chi(G) \geq \omega(G)$ and $\chi(G) \geq \frac{n}{\alpha(G)}$

6. Suppose G has n vertices and $\chi(G) = k$. Prove that $|E(G)| \geq \binom{k}{2}$.

7. Prove that a graph is bipartite if and only if it contains no odd cycles.

8. Consider the following graph:

   (a) Show that $\chi(G) = 4$.
   (b) Show that $\chi(G - E) = 3$ for any edge E.

PILOT Learning - Tip of the Week

Thank you for a great semester. We will be sending out a survey very soon and we encourage you to provide your feedback on your experience(s) in PILOT Learning this semester.

We wish you the best of luck on your finals. Have a wonderful summer!

5 Study Tips to Get You Through Finals at JHU

   1. **Be the teacher** – explaining something to someone else is one of the best ways to learn the information yourself. Teach a friend!

   2. **Turn Netflix OFF and your music ON** – music can help you to focus if you pick the right songs. You can even make up new lyrics to your favorite songs using formulas or concepts you need to memorize.

   3. **Don't split the work with a study buddy** – have a friend make a study sheet for the final exam separately, then get together after you both are done and review the topics together. This can help you to cover all of your bases.

   4. **Go Online!** – still confused about a particular subject? Check out online resources like Khan Academy or Brilliant.org to support your learning.

   5. **Take time to plan and prepare** – check out our website under Resources for quick tips and course study guides as well as tools to assist in prioritization, active reading and time management.