Last name _____

First name _____

LARSON—MATH 356–CLASSROOM WORKSHEET 24

1. (a) Start Chrome browser.
   (b) Go to `http://cocalc.com` and "Sign In".
   (c) Click project **Math 356**.
   (d) Click "New", call it **c24**, then click "Sage Worksheet".

The **complement** of a graph G is a graph G^c with the same set of vertices (so $V(G^c) = V(G)$ and with edges $E(G^c) = \{vw : v, w \in V(G^c) \text{ and } vw \notin E(G)\}$ (that is, vw is a edge in G^c if and only if it is not a line in G).

2. Evaluate `pete = graphs.PetersenGraph()`. To get the complement of a graph G in Sage use `G.complement()`. So to find the complement of the Petersen graph, and to give the new graph the name `pete_complement` use `pete_complement=pete.complement()`. Use `.show()` to draw this graph.

3. Find the size of `pete_complement`.

4. Let `k_3_4 = graphs.CompleteBipartiteGraph(3,4)`. Find the complement of this graph and use `.show()` to draw it.

A **clique** in a graph is a complete subgraph (so the vertices $S \subseteq V(G)$ induce a clique in graph G if and only if G has a line between every pair of vertices of S). A clique in a graph is maximal if it is not contained in a larger clique. A clique is maximum if it has more vertices than any other clique.

To find a maximum clique in a graph G with Sage use `G.clique_maximum()`.

5. Find a maximum clique in the Petersen graph.

6. Find a maximum clique in the complement of the Petersen graph.

To find the clique number of a graph G in Sage, use `G.clique_number()`.

7. Find ω for the Petersen graph.

8. Find ω for the complement of the Petersen graph.

9. Find ω for `k_3_4`.

10. Find ω for the complement of `k_3_4`.

11. Evaluate the code on p.29 of our book. "Show" the graphs to check.

12. Evaluate the code on p.34 of our book. "Show" the graphs to check.

13. Evaluate the code on p.36 of our book."Show" the graphs to check.

14. Evaluate the code on p.40 of our book."Show" the graphs to check.