Last name _____

First name _____

LARSON—MATH 356—CLASSROOM WORKSHEET 01
Introduction.

**What is a graph? (From Sec. 1.6 of Wilf)**

1. What is the definition of a *graph*?

2. What does it mean for vertices to be *adjacent*?

3. What is a *drawing* of a graph? (The drawing is not unique!)

   Some Background

4. What are graphs, and what can they be used for?

5. What is the history of graph theory, what are its origins?
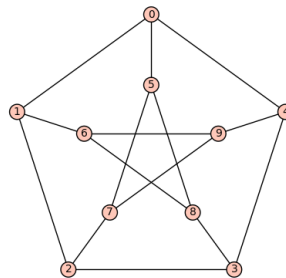
Independent sets and Independence number

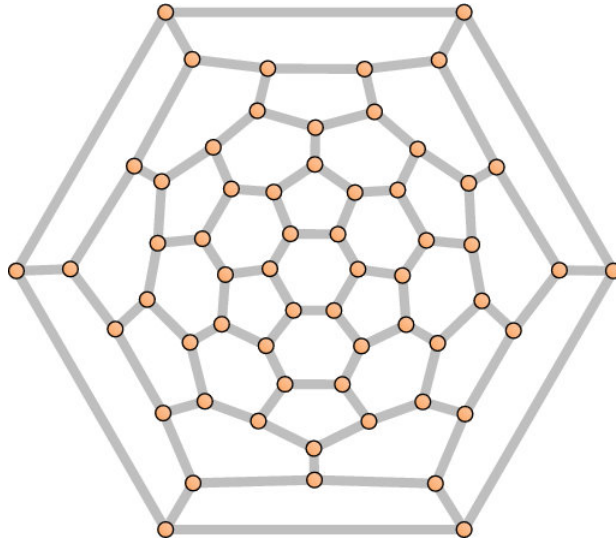6. What is an *independent set* of vertices?
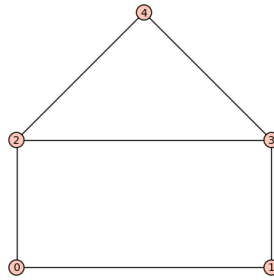
7. Find a largest (maximum) independent set in the *house graph*? (Can you prove it is maximum?)

8. The cardinality of a maximum independent set in a graph G is its *independence number* (denoted $maxset(G)$ in our book). If G is the house graph, what is $maxset(G)$?
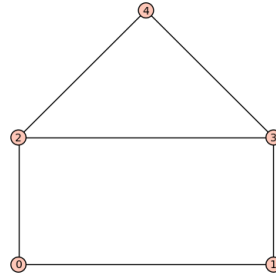

9. Find a largest (maximum) independent set in the *Petersen graph*? (Can you prove it is maximum?)

10. Find a largest (maximum) independent set in the *Buckyball graph*? (Can you prove it is maximum?)

Algorithms

11. *How* can we find a maximum independent set in a graph?

12. What is a *set*? What is a *subset* of a set?

13. List all the subsets of $\{0, 1, 2, 3, 4\}$. How many subsets are there?

14. For each subset, check if it is an independent set in the house graph.

15. Describe an algorithm (recipe) to find a maximum independent set in a graph?

16. This algorithm requires checking all the subsets of vertices of a graph. How many are there? (How many subsets are there to check for a graph with n vertices?)