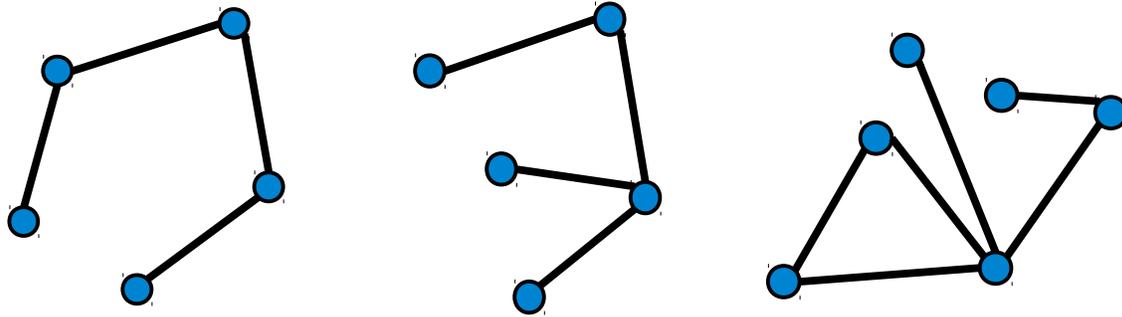


We're going to use these three graphs for this problem set.



1. For these three graphs, write down the degree distribution and the mean path length for each of them.
2. Draw a graph with 5 nodes where one node has degree 1, three nodes have degree 2, and one node has degree 3.
3. A transitive graph is a graph with the following property:

Transitivity: if there is an edge between node x and node y and if there is an edge between node y and node z , then there is an edge between node x and node z .

Draw as many transitive graphs with five nodes as you can.

4. What is the clustering coefficient of a transitive graph?
5. A regular graph is one where every node has exactly the same degree as every other. Draw as many regular graphs with 5 nodes as you can.
6. A *node coloring* is an assignment of a color to each node so that no two nodes that are connected by an edge have the same color. (Think the coloring of different countries on a map, no two countries that share a border should be colored the same way.) For the three graphs at the top of the page, figure out the minimum number of colors you need to make a coloring of each one.
7. Consider a graph with 5 nodes. Draw a graph that requires 5 colors. Draw a graph that requires 3. Draw a graph that only requires 1.
8. Remember the cycle graph. Suppose you have a cycle graph with n nodes. How many colors do you need? Does it depend on n ? If so, how so?
9. Is there a relationship between the degree distribution and the number of colors needed to color the graph? What is it?