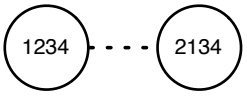
Math 22, Wtr 2016 Name: _____

People-Permutations

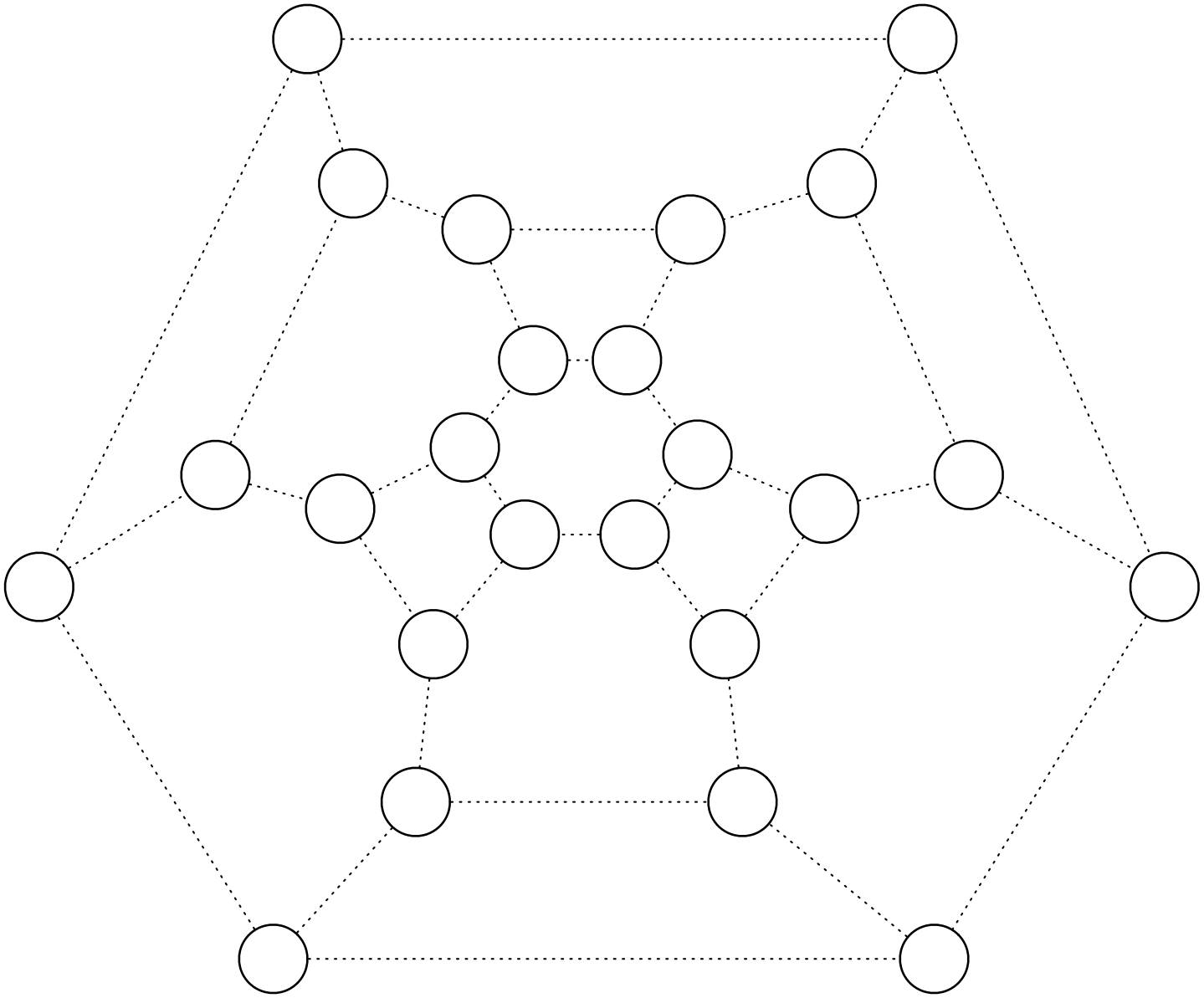
Use the numbers 1, 2, 3, and 4 for your group members, and write their names here:

1 = _____ 2 = _____ 3 = _____ 4 = _____

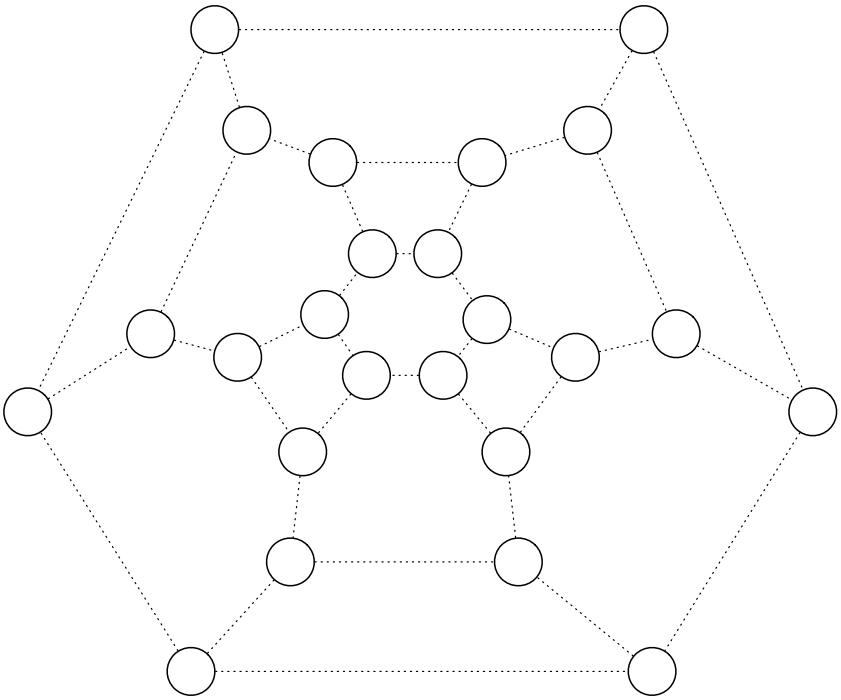
Fill in each of the circles with one of the permuations of 1, 2, 3, and 4. Two circles below should be adjacent (joined by an edge) if and only if the permutations they represent differ by the switch of two neighbors. For example 1234 will be adjacent to 1243, since that is obtained by switching the 3 and 4.:

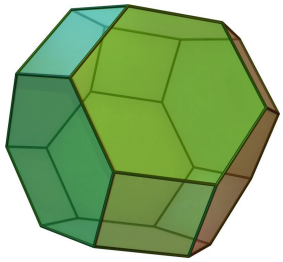


1234 is not adjacent to 2143, for example, since that would involve two simultaneous switches, 2<–>1 and 3<–>4.



Find a sequence of permutations that creates a Hamiltonian cycle in the above graph that includes every permutation (or circle "vertex") exactly once, and only uses the edges of the graph; darken the edges in the graph below to show this cycle (use the vertex labels from the previous page, you do not need to write the labels in here again, just show the cycle!) This shape is the "truncated octahedron," shown below on the right.





With your group standing in a line, practice going through the sequence of 24 permutations dictated by the Hamiltonian cycle you drew above. You may find patterns that help you remember the sequence. You will demonstrate your sequence to the instructor during class! **If you can find an entertaining way to move efficiently through all 24 permutations, you may demonstrate that to the entire class!**

Now also add all edges showing additional adjacencies between two permutations that differ by TWO simultaneous switches between the first and second numbers and the third and fourth numbers; for example, 1234 is then adjacent also to 2143, since 1 and 2 switch with each other at the same time that 3 and 4 switch. (Use the vertex labels from the previous page, you do not need to write the labels in here again!)