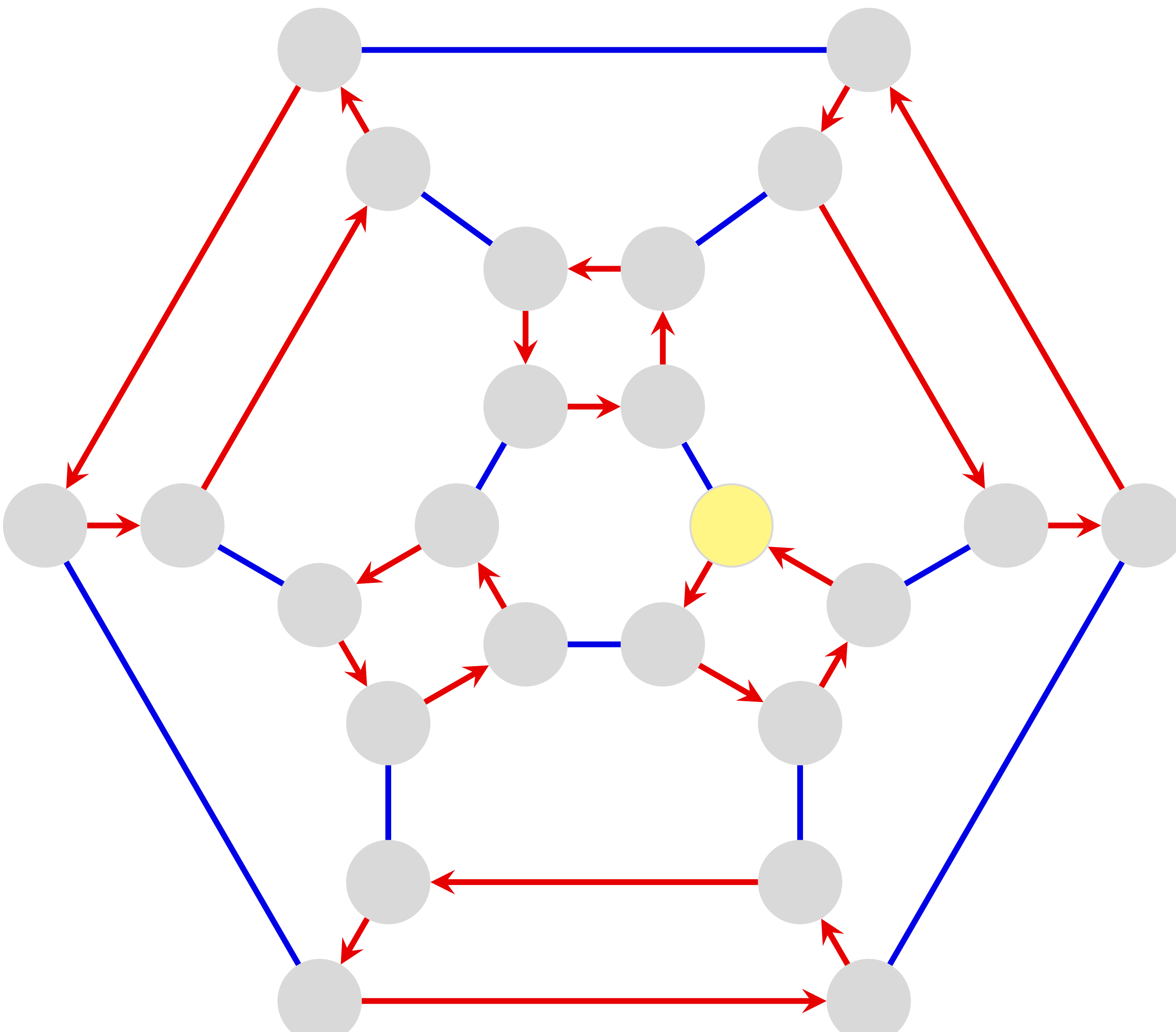
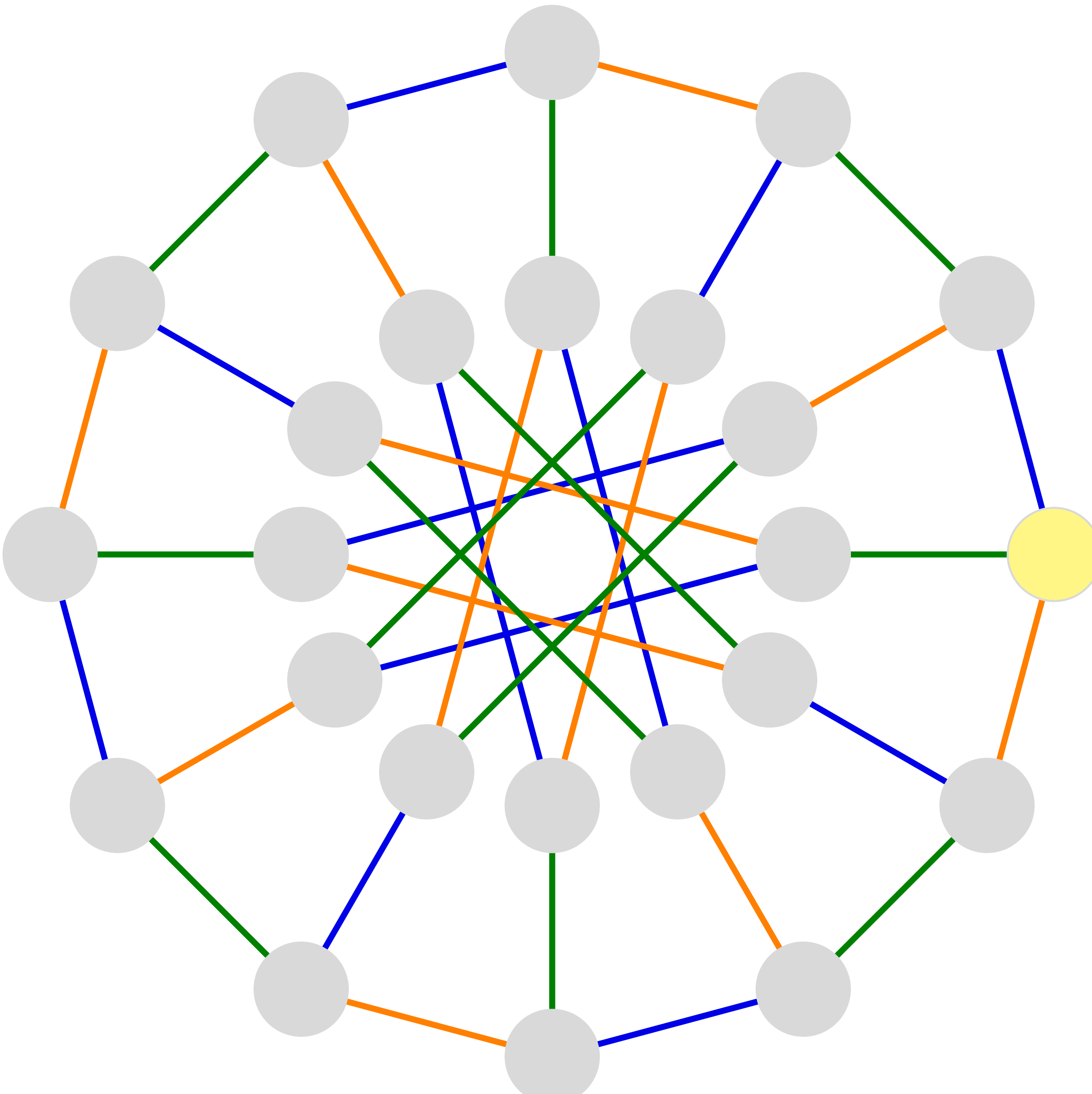
Supplemental material for Visual Algebra (Math 4120), HW 3

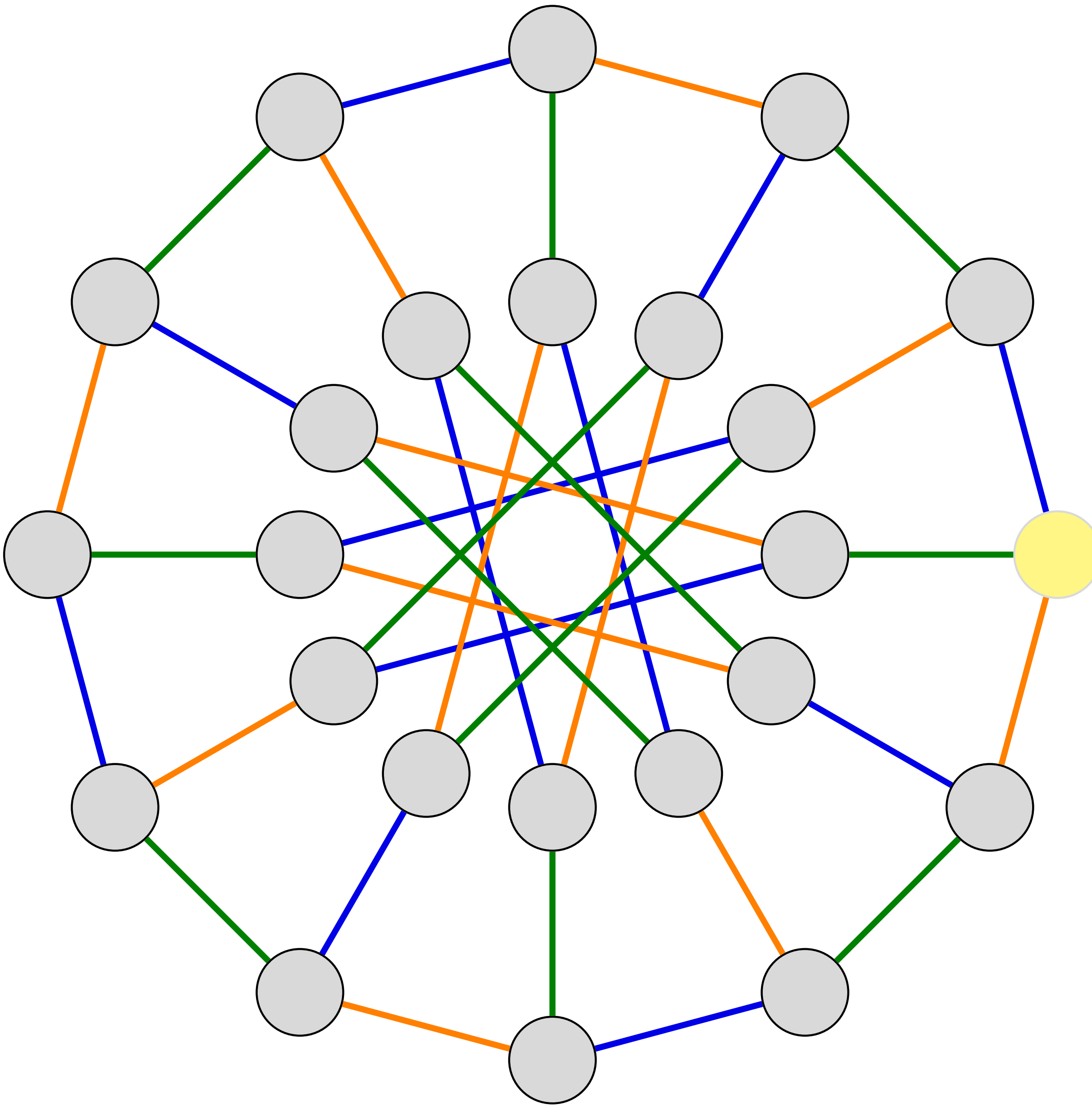
#1(a): Cayley graph for the symmetric group $S_4 = \langle (1234), (12) \rangle$ on a *permutohedron*. The nodes are labeled by permutations, written in cycle notation, as a product of disjoint cycles.



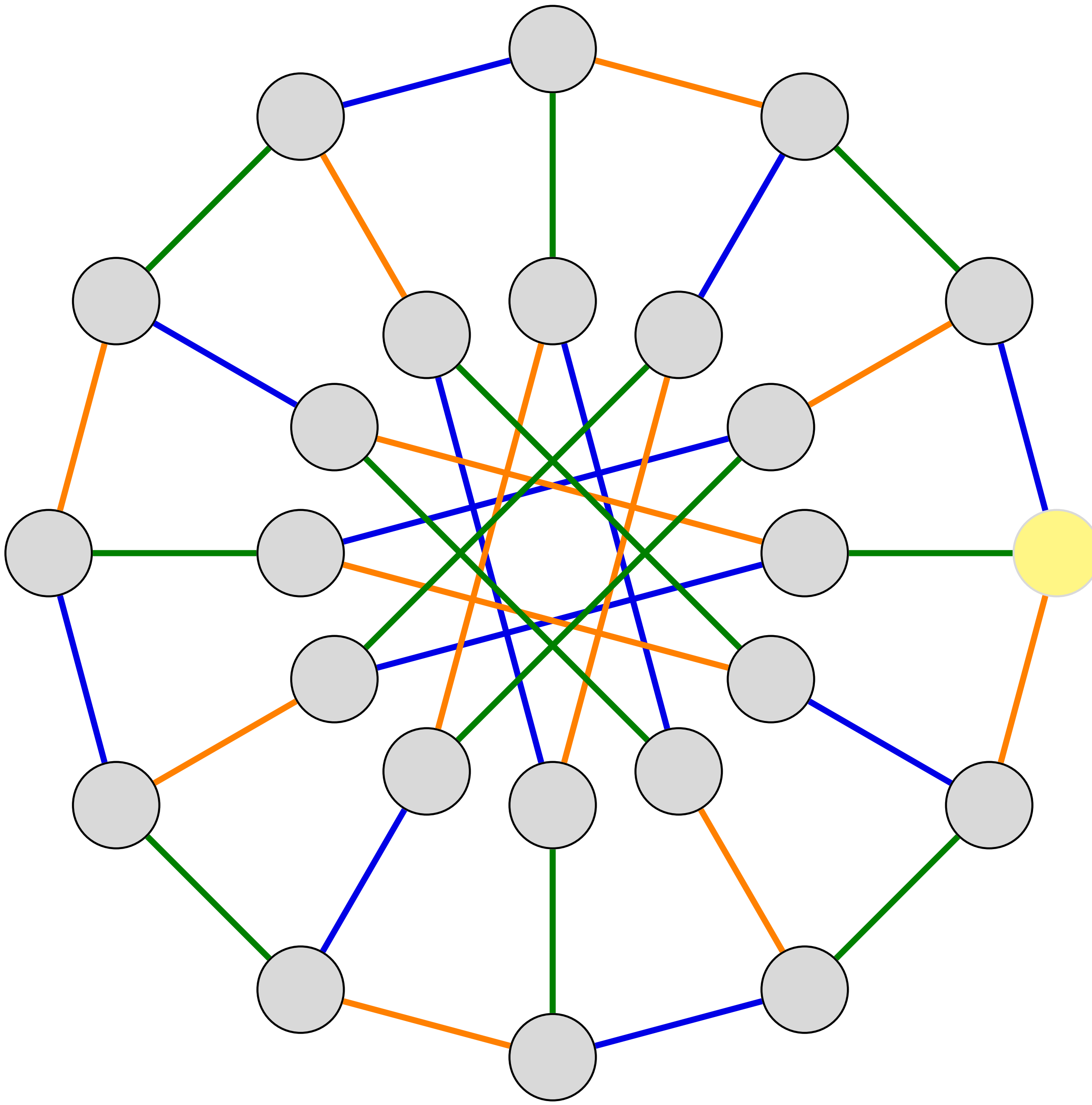
#1(a): Cayley graph for the symmetric group $S_4 = \langle {\color{blue}(12)}, {\color{green}(13)}, {\color{orange}(14)} \rangle$ on the *Nauru graph*. The nodes labeled by permutations, written in cycle notation, as a product of disjoint cycles.



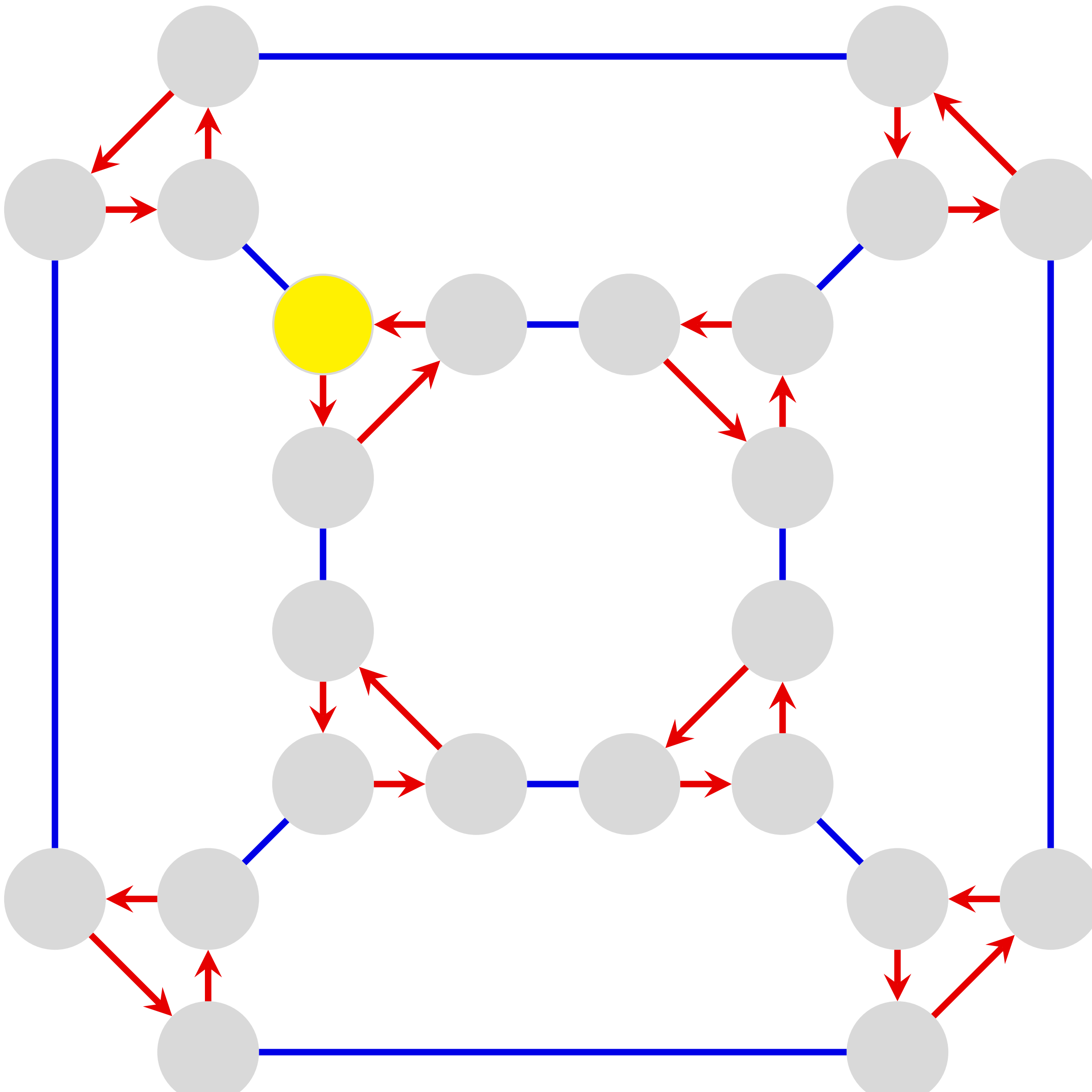
#1(b): Cayley graph for the symmetric group $S_4 = \langle \textcolor{blue}{(12)}, \textcolor{green}{(13)}, \textcolor{orange}{(14)} \rangle$ on the *Nauru graph*. The nodes labeled by with permutations of the word **1234**, where $(i\ j)$ swaps the i^{th} and j^{th} *coordinates*.



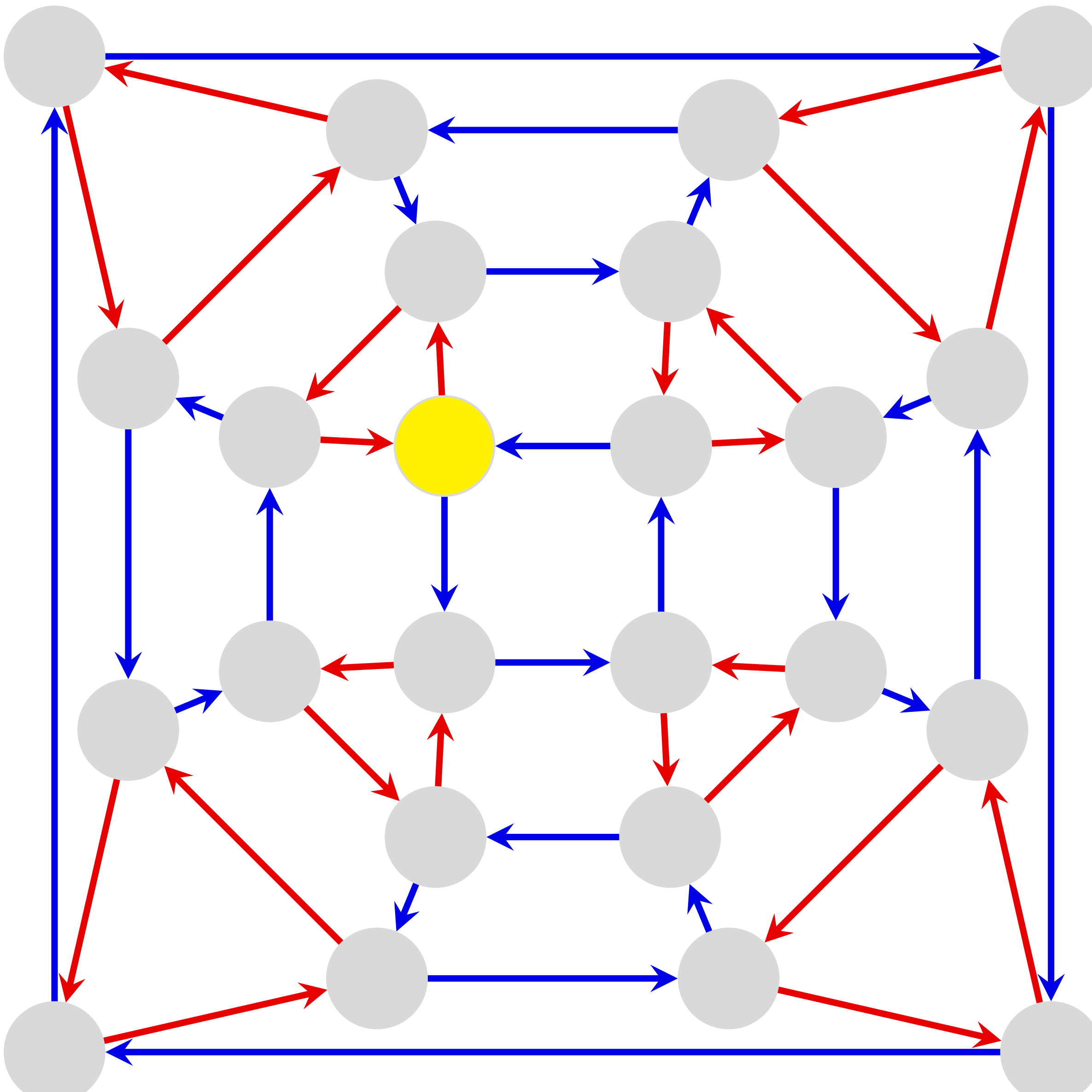
#1(c): Cayley graph for the symmetric group $S_4 = \langle \textcolor{blue}{(12)}, \textcolor{green}{(13)}, \textcolor{orange}{(14)} \rangle$ on the *Nauru graph*. The nodes labeled with permutations of the word **1234**, where $(i\ j)$ swaps the *numbers* i and j.



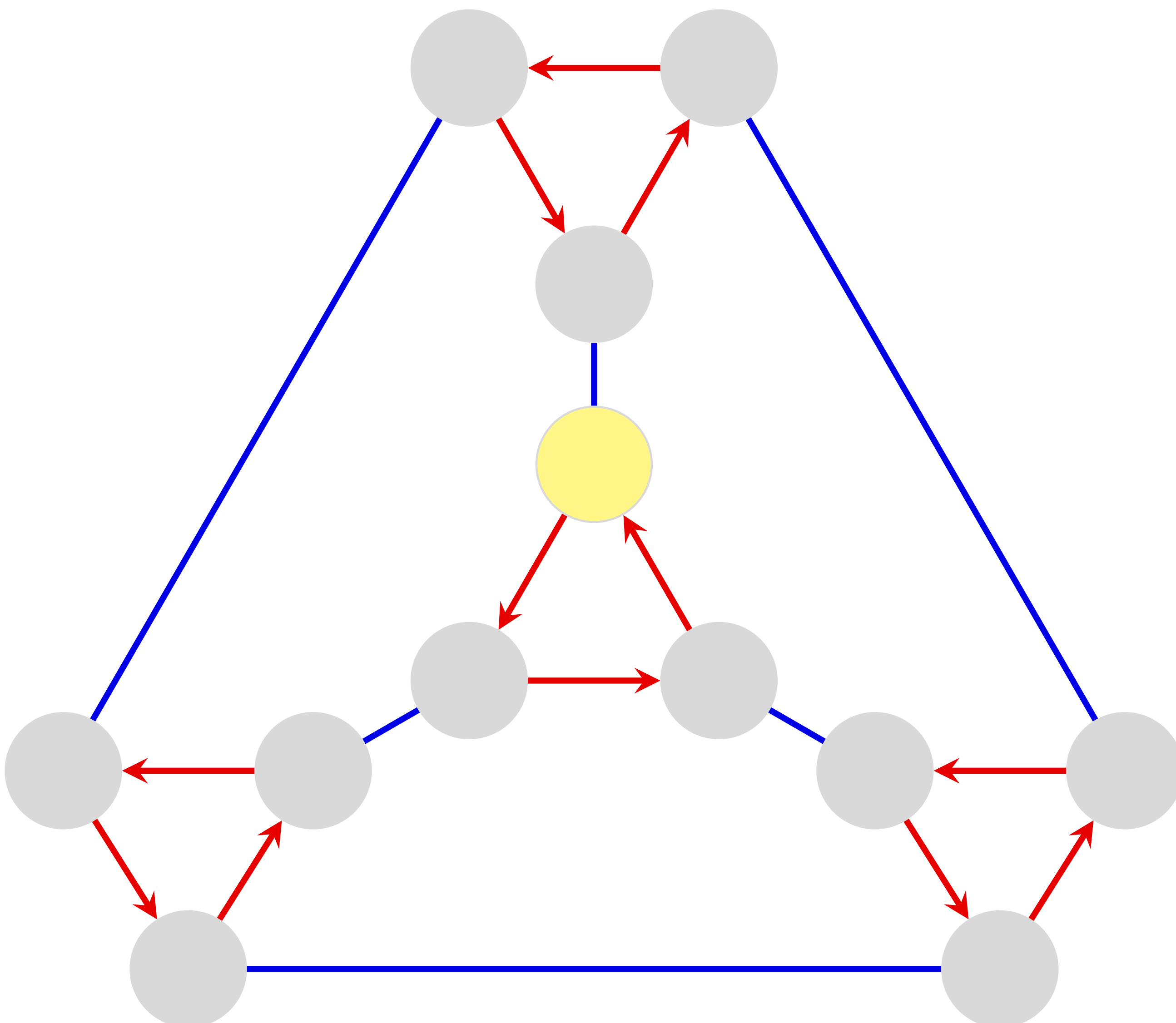
#2: Cayley graph for the symmetric group S_4 on a *truncated cube*. The nodes are labeled by permutations, written in cycle notation, as a product of disjoint cycles.



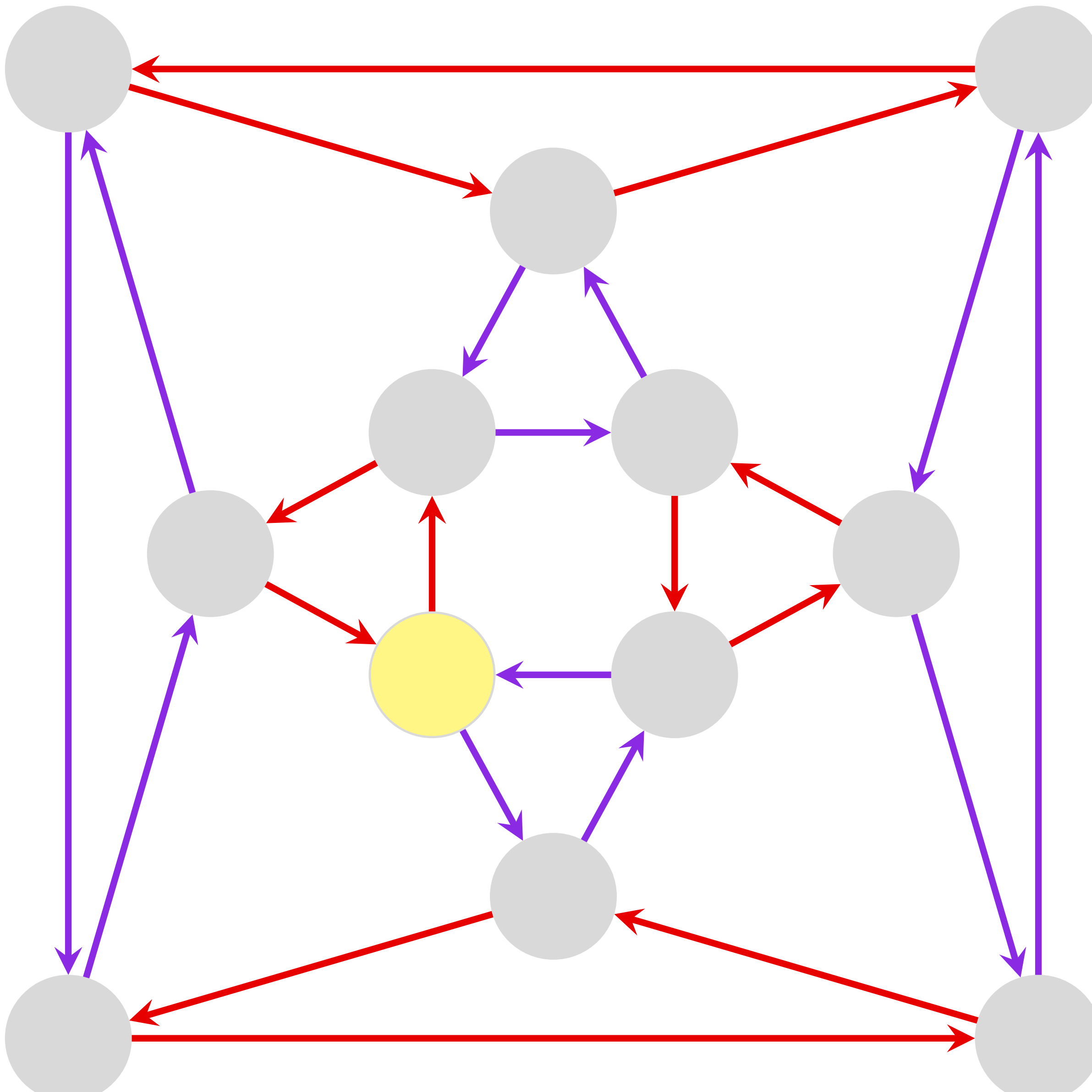
#2: Cayley graph for the symmetric group S_4 on a *rhombicuboctahedron*. The nodes are labeled by permutations, written in cycle notation, as a product of disjoint cycles.



#3: Cayley graph for the alternating group $A_4 = \langle (123), (12)(34) \rangle$ on a *truncated tetrahedron*. The nodes are labeled by permutations, written in cycle notation, as a product of disjoint cycles.



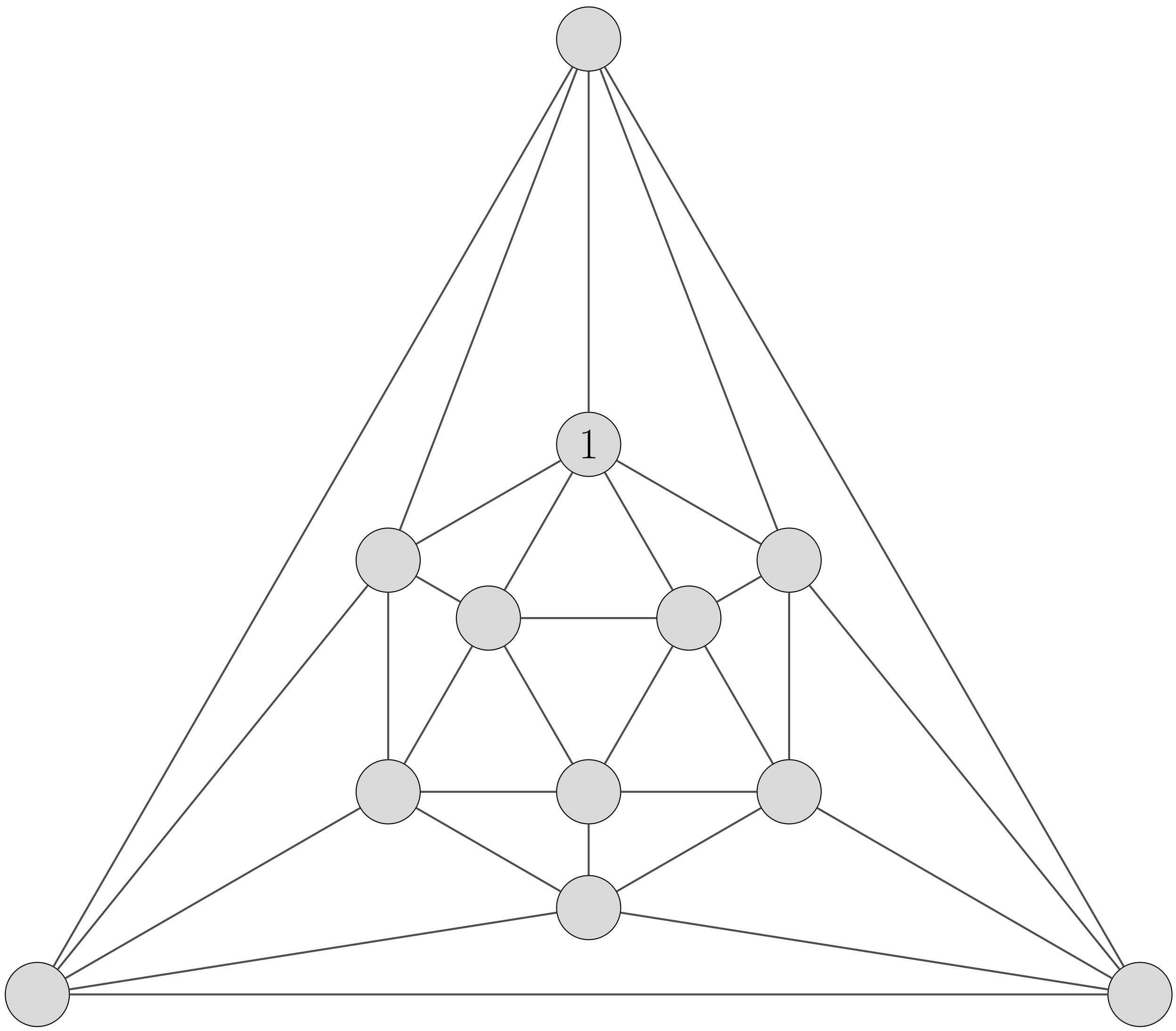
#3: Cayley graph for the alternating group $A_4 = \langle (123), (234) \rangle$ on a *cuboctahedron*. The nodes are labeled by permutations, written in cycle notation, as a product of disjoint cycles.



#4: Cayley graph of the group

$$G = \left\langle a, b, c \mid a^2 = b^3 = c^3 = abc = 1 \right\rangle$$

on the skeleton of the icosahedron, with nodes labeled by words from this generating set.



#4: Cayley graph of the group

$$G = \left\langle a, b, c \mid a^2 = b^3 = c^3 = abc = 1 \right\rangle$$

on the skeleton of the icosahedron, with nodes labeled by the elements of the familiar group it is isomorphic to. Since it has order 12, it must be either $C_{12} = \langle r \rangle$, $C_6 \times C_2 = \left\langle (r, s) \right\rangle$, $D_6 = \langle r, f \rangle$, $A_4 = \left\langle (123), (12)(34) \right\rangle = \left\langle (123)(234) \right\rangle$, or $\mathrm{Dic}_6 = \langle r, s \rangle$.