

1. Write the following in cycle notation.

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 2 & 5 & 1 & 3 \end{pmatrix}$$

2. Compute each of the following $(123)(45)(1254)^{-1}$.

3. Express the following permutations as products of transpositions and identify it as even or odd.

$$(17254)(1423)(154632)$$

4. Let $G = S_4$. Determine the elements that belong to $\{\sigma \in G : \sigma(1) = 3\}$. Is this a subgroup?

5. Let $G = S_4$. Compute the stabilizer G_2 . Is this a subgroup?

6. * Let $G = M_2(\mathbb{R})$ and

$$A = \begin{pmatrix} 1/2 & \frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}.$$

Find $\langle A \rangle$ and determine the order of A .