

6. Recall that D_3 is the smallest subgroup of the group of rigid motions which contains ρ and σ , where ρ is rotation counter clockwise by 120° fixing the origin and σ is reflection of the xy plane across the x axis. List 4 subgroups of D_3 in addition to D_3 and $\{\text{id}\}$. (I do not need to see any details.)

$$\{\text{id}, \sigma\}$$

$$\{\text{id}, \sigma\rho^3\}$$

$$\{\text{id}, \sigma\rho^2\}$$

$$\{\text{id}, \rho, \rho^2\}$$

7. The Dihedral group D_4 consists of 8 elements id , ρ , ρ^2 , ρ^3 , σ , $\sigma\rho$, $\sigma\rho^2$, and $\sigma\rho^3$. In class we calculated that $\rho\sigma = \sigma\rho^3$, $\rho^4 = \text{id}$, and $\sigma^2 = \text{id}$. Express $\rho^2\sigma\rho\sigma$ in the form $\sigma^i\rho^j$ for some integers i and j , with $0 \leq i \leq 1$, and $0 \leq j \leq 3$.

$$\rho^2\sigma\rho\sigma = \rho(\rho\sigma)\rho\sigma = \rho(\sigma\rho^3)\rho\sigma = \rho\sigma\rho^4\sigma = \rho\sigma\sigma = \rho$$