

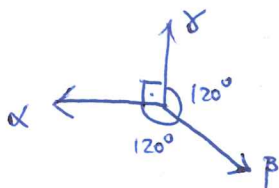
Name and Surname:
 Student Number:

Math 466 - Fall 2019 - METU

Quiz 10

Consider the finite reflection group $W = \langle s_\alpha, s_\beta, s_\gamma \rangle$ where $\alpha = e_1 - e_2$, $\beta = e_2 - e_3$, and $\gamma = e_3 - e_4$. Set $\mathcal{B} = \{\alpha, \beta, \gamma\}$ and $V = \text{span}(\mathcal{B}) \subsetneq \mathbb{R}^4$. Regard \mathcal{B} as an ordered basis for V . This construction is referred as A_3 .

1. Find the angles in between each pair of vectors from the basis \mathcal{B} .

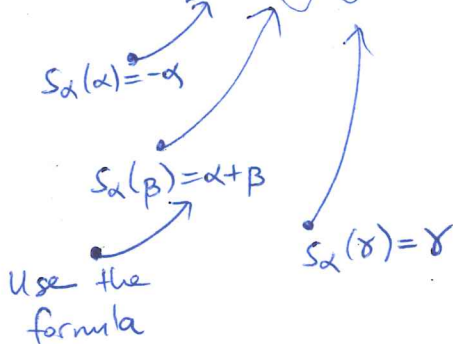


Use $\cos \theta = \frac{\langle \alpha, \beta \rangle}{\|\alpha\| \cdot \|\beta\|}$

2. Determine the matrix representations $[s_\alpha]_{\mathcal{B}}$, and $[s_\gamma]_{\mathcal{B}}$. (You may use the formula $s_\alpha(\lambda) = \lambda - \frac{2\langle \lambda, \alpha \rangle}{\langle \alpha, \alpha \rangle} \alpha$.)

$$[s_\alpha]_{\mathcal{B}} = \begin{bmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$[s_\gamma]_{\mathcal{B}} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$$



3. Compute $[s_\alpha s_\gamma]_{\mathcal{B}} = [s_\alpha]_{\mathcal{B}} [s_\gamma]_{\mathcal{B}}$ and determine its order.

$$[s_\alpha s_\gamma]_{\mathcal{B}} = \begin{bmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & -1 \end{bmatrix} \text{ has order 2.}$$