

Let $S = \{1, 2, 3, 4, 5, 6, 7, 8\}$, and let

$$G = \left\{ [1], [1 \ 3 \ 2] [4 \ 6 \ 5] [7 \ 8], [1 \ 2 \ 3] [4 \ 5 \ 6], \right. \\ \left. [1 \ 3 \ 2] [4 \ 6 \ 5], [1 \ 2 \ 3] [4 \ 5 \ 6] [7 \ 8], [7 \ 8] \right\} \subset S_8.$$

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Let $S = \{1, 2, 3, 4, 5, 6, 7, 8\}$, and let

$$G = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 4 & 6 & 5 \end{bmatrix} \begin{bmatrix} 7 & 8 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}, \right. \\ \left. \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 4 & 6 & 5 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \subset S_8.$$

Find

1. $\text{stab}_G(3)$, $\text{orb}_G(3)$
2. $\text{stab}_G(4)$, $\text{orb}_G(4)$
3. $\text{stab}_G(5)$, $\text{orb}_G(5)$
4. $\text{stab}_G(6)$, $\text{orb}_G(6)$
5. $\text{stab}_G(7)$, $\text{orb}_G(7)$
6. $\text{stab}_G(8)$, $\text{orb}_G(8)$

What can we conclude about the orbits of the elements of S ?

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$$G = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 4 & 6 & 5 \end{bmatrix} \begin{bmatrix} 7 & 8 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}, \right. \\ \left. \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 4 & 6 & 5 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \subset S_8.$$

Then

$$\text{stab}_G(1) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \qquad \text{orb}_G(1) = \{1, 2, 3\}$$

$$\text{stab}_G(2) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \qquad \text{orb}_G(2) = \{1, 2, 3\}$$

$$\text{stab}_G(3) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \qquad \text{orb}_G(3) = \{1, 2, 3\}$$

$$\text{stab}_G(4) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \qquad \text{orb}_G(4) = \{4, 5, 6\}$$

$$\text{stab}_G(5) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \qquad \text{orb}_G(5) = \{4, 5, 6\}$$

$$\text{stab}_G(6) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 7 & 8 \end{bmatrix} \right\} \qquad \text{orb}_G(6) = \{4, 5, 6\}$$

$$\text{stab}_G(7) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}, \right. \\ \left. \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 4 & 6 & 5 \end{bmatrix} \right\} \qquad \text{orb}_G(7) = \{7, 8\}$$

$$\text{stab}_G(8) = \left\{ \begin{bmatrix} 1 \end{bmatrix}, \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}, \right. \\ \left. \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 4 & 6 & 5 \end{bmatrix} \right\} \qquad \text{orb}_G(8) = \{7, 8\}$$