

HW 16

$$14. \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 4 & 2 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 2 & 3 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}, \\ \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 1 & 4 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 3 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 2 & 4 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 4 & 1 \end{pmatrix}, \\ \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 1 & 3 & 2 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 1 & 3 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 2 & 1 \end{pmatrix}$$

There are 12 elements in A_4

16. H is a subgroup of A since H i) has the same identity element ii) For any 2 elements ab , the product ab is also in H . iii) associativity is present iv) each element has an inverse also in H

1c

$$H = \begin{matrix} 1234 & 1234 & 1234 \\ 1234 & 1234 & 3124 \end{matrix}$$

$$a_1 = \begin{matrix} 1234 \\ 1342 \end{matrix} \quad a_1 \cdot H = \left[\begin{matrix} 1234 & 1234 & 1234 \\ 1342 & 3412 & 4132 \end{matrix} \right]$$

$$a_2 = \begin{matrix} 1234 \\ 1423 \end{matrix} \quad a_2 \cdot H = \left[\begin{matrix} 1234 & 1234 & 1234 \\ 1423 & 4213 & 2143 \end{matrix} \right]$$

$$a_3 = \begin{matrix} 1234 \\ 2143 \end{matrix} \quad a_3 \cdot H = \left[\begin{matrix} 1234 & 1234 & 1234 \\ 2143 & 1423 & 3241 \end{matrix} \right]$$

$$a_4 = \begin{matrix} 1234 \\ 2431 \end{matrix} \quad a_4 \cdot H = \left[\begin{matrix} 1234 & 1234 & 1234 \\ 2431 & 4321 & 3241 \end{matrix} \right]$$

$$a_4 = \begin{matrix} 1234 \\ 3241 \end{matrix}$$

$$a_4 \cdot H = \left[\begin{matrix} 1234 & 1234 & 1234 \\ 1342 & 2314 & 3124 \end{matrix} \right]$$

They have the same number of elements since there exists a bijective map from any left coset a to any other left coset b .

They can't have a common element since this would defy the definition of coset