

Lesson 15

COSETS – PRACTICE

The symmetric group of degree 4 is

$$S_4 = \left\{ \begin{array}{l} (), (1,2), (1,3), (1,4), (2,3), (2,4), (3,4), (1,2)(3,4), (1,3)(2,4), (1,4)(2,3), (1,2,3), \\ (1,3,2), (1,2,4), (1,4,2), (1,4,3), (2,3,4), (2,4,3), (1,2,3,4), ((1,2,4,3), (1,3,4,3), (1,3,2,4), \\ (1,4,3,2), (1,4,2,3) \end{array} \right\}.$$

For the given subgroup H , find the total number of left or right cosets of H in S_4 , and find the specific left and right cosets of H in S_4 created by the permutation $(1,2)$.

1. $H = \{ (), (2,4), (1,2)(3,4), (1,2,3,4), (1,3), (1,3)(2,4), (1,4,3,2), (1,4)(2,3) \}$. (NOTE: H is not normal (self-conjugate) in S_4 .)

2. $H = \left\{ \begin{array}{l} (), (2,3,4), (2,4,3), (1,2)(3,4), (1,2,3), (1,2,4), (1,3,2), (1,3,4), (1,3)(2,4), (1,4,2), \\ (1,4,3), (1,4)(2,3) \end{array} \right\}$.

(NOTE: H is normal (self-conjugate) in S_4 .)