# Reading Questions 20

#### page 110: Definition 5.1

- 1. Let G be a group such that  $x \in G$  and  $H \subseteq G$ . If Hx is a right cosets then H must be a subgroup of G.
- 2. Let G be a group such that  $x \in G$  and  $H \leq G$ . Then Hx is a subgroup of G.
- 3. Let  $G = \mathbb{Z}_5$  and  $H = \langle 2 \rangle$  and x = 3. List the elements of Hx.

# Section 5.1 Translation Action and Cosets (Part 1)

### Cosets

**P** 1. Let  $G = S_4$  and  $H = \langle (123) \rangle$ . List the right cosets of H in G.

**P 2.** Let G be a group such that  $H \leq G$  and  $x, y \in G$ . Prove Hx = Hy if and only if  $yx^{-1} \in H$ .

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**P** 3. Let  $G = S_4$  and H = <(123) >. What is |H:G|?

**P** 4. Let  $G = D_8$  and  $H = \langle R_{90} \rangle$ . List the left cosets of H in G.