

1 For each group G and subgroup $H \leq G$ below, list all left cosets of H in G and list all right cosets of H in G . You do not need to show every detail of your work.

(a) $G = \mathbb{Z}_8, H = \langle 2 \rangle$

(b) $G = \mathbb{Z}_8, H = \langle 4 \rangle$

(c) $G = D_4, H = \langle r \rangle$

(d) $G = D_4, H = \langle sr^2 \rangle$

(e) $G = Q_8, H = \langle -1 \rangle$

(f) $G = Q_8, H = \langle j \rangle$

2 Let G be a group and $H \leq G$ be a subgroup. For $a, b \in G$, prove that $aH = bH$ if and only if $Ha^{-1} = Hb^{-1}$.