Exercise 1. Let $G$ be a group and let $H \leq G$. Prove that if $xHx^{-1} \subseteq H$ for all $x \in G$, then $H \subseteq xHx^{-1}$ for all $x \in G$.

Exercise 2. Prove that $\text{SL}_2(\mathbb{R}) \lhd \text{GL}_2(\mathbb{R})$. Is the Borel subgroup $B$ normal in $\text{GL}_2(\mathbb{R})$?

Exercise 3. Prove that $\langle r \rangle \lhd D_n$. 