Exercise 1. Let $Q$ and $P$ be the position and momentum operators, respectively, on $L^2(\mathbb{R})$.

(a) What is the domain of $Q$?
(b) What is the domain of $P$?
(c) Prove that $C_c^\infty(\mathbb{R})$ is contained in both of the above domains.

Exercise 2. Let $\{U_t\}$ be a 1-parameter unitary group on a Hilbert space $\mathcal{H}$, and let $W$ be a unitary operator on $\mathcal{H}$. Prove that if $A$ is the infinitesimal generator of $\{U_t\}$, then $WAW^*$ is the infinitesimal generator of $\{WU_tW^*\}$. 