

Q2: Let $z = a + ib$. Properties of the modulus tells us that

$$\begin{aligned} & \left| \frac{z-1}{z+1} \right| \leq 1 \\ \iff & \frac{|z-1|}{|z+1|} \leq 1 \\ \iff & |z-1| \leq |z+1| \\ \iff & (a-1)^2 + b^2 \leq (a+1)^2 + b^2 \\ \iff & a^2 - 2a + 1 \leq a^2 + 2a + 1 \\ \iff & 0 \leq 4a \\ \iff & 0 \leq a \end{aligned}$$

Hence the region defined by the inequality will be $R = \{a + ib \in \mathbb{C} : a \geq 0\}$.