1. Give an example of a family of entire functions that is not a normal family when considered as a family of functions whose domain is the whole plane $\mathbb{C}$ but that is a normal family when considered as a family of functions whose domain is the unit disc $\{ z \in \mathbb{C} : |z| < 1 \}$.

2. Determine the number of solutions to the equation
$$z^{11} + 25z^7 + 43z = 1$$
in the annulus $\{ z \in \mathbb{C} : 1 < |z| < 2 \}$.

3. In view of the Riemann mapping theorem, there exists an invertible holomorphic function (a conformal mapping) that maps the first quadrant $\{ z \in \mathbb{C} : \operatorname{Re} z > 0 \text{ and } \operatorname{Im} z > 0 \}$ onto the unit disc $\{ z \in \mathbb{C} : |z| < 1 \}$. Find an explicit example of such a function.

4. Suppose f is a holomorphic function that is defined in the unit disc $\{ z \in \mathbb{C} : |z| < 1 \}$ and that has image contained in the unit disc. If $f(0) = 0$ and $f'(0) = 0$, how big can $|f''(0)|$ be?

5. Suppose that G is a connected open subset of $\mathbb{C}$, and $\{f_n\}_{n=1}^{\infty}$ is a sequence of holomorphic functions converging normally (that is, uniformly on compact subsets of G) to a non-constant holomorphic limit function f. Prove that if every function f_n in the sequence is a one-to-one (that is, injective) function, then the non-constant limit function f must be one-to-one.