1. Determine all bijective conformal self-maps of $\mathbb{C} \setminus \{0, 1\}$.

2. Let $\Omega$ be a non-empty open subset of $\mathbb{C}$, and let $f$ be a continuous function on $\Omega$. Suppose that $f_1, f_2, f_3, \ldots$ are analytic on $\Omega$, and that

$$\lim_{n \to \infty} \int_D |f_n(x + iy) - f(x + it)| dxdy = 0,$$

for every closed disk $D \subset \Omega$. Show that $f$ is analytic, and that $f_n \to f$ uniformly on compact subsets of $\Omega$.

3. Prove that the range of the entire function $z \mapsto z^2 + \cos(z)$ is all of $\mathbb{C}$.

4. Determine the partial fraction expansion for $z \mapsto \frac{1}{z \sin z}$.