1. Let \( u(x, y) = 2xy + x - y \). Prove that \( u \) is harmonic. Also find the harmonic conjugate of \( u \).

2. Let \( a \in \mathbb{C} \) with \( \text{Im}(a) > 0 \). Prove that \( |\frac{z-a}{z-a}| < 1 \) if and only if \( \text{Im}(z) > 0 \).

3. Compute \( \int_{|z|=1} \frac{\cos z}{z^3} \, dz \).

4. Assume \( f(z) \) is entire and \( f(z) = f(z + 1) \), \( f(z + i) = f(z) \) for all \( z \). Prove \( f \) is constant.

5. Calculate the Laurent series for \( f(z) = \frac{1}{z-z^2} \) for \( |z| > 1 \).