1. Use Abel’s theorem (Problem 2 from Homework 2) to compute

\[ \sum_{n=0}^{\infty} \frac{\sin(2n+1)\phi}{2n+1}, \quad 0 < \phi < \pi. \]

2. Compute

\[ \int_{0}^{2\pi} \frac{d\phi}{a + \cos \phi}, \quad a > 1. \]

3. Determine the number of solutions in each quadrant of the equation

\[ 2z^4 - 3z^3 + 3z^2 - z + 1 = 0. \]

4. Find a biholomorphism \( f \) which maps the disc \( D_R = \{|z| < R\} \) onto the half-plane \( \{ \text{Re} z > 0 \} \) and such that \( f(R) = 0, f(-R) = \infty, f(0) = 1. \)

5. Let \( U = \mathbb{C} \setminus \{z; \text{Re} z \leq 0, \text{Im} z = 0\} \). Find a holomorphic function \( f : U \to \mathbb{C} \) such that \( \arg f(z) = \phi + r \sin \phi \) for \( z = re^{i\phi} \).