1. What are the values of the following complex expressions? Show them in the complex plane.
   (a) \( i^i \)
   (b) \( \tan i \)

2. The following functions \( f(x) \) are expanded in powers of \( x \) (i.e. in Taylor or Laurent series around the origin); \( x \) is a real variable, \( f(x) \) is a real-valued function. Find the intervals of convergence of the series.
   (a) \( f(x) = \frac{1}{\sin x} \)
   (b) \( f(x) = \frac{1}{\sin x + 2} \)

3. (a) Formulate and prove the Argument Principle.
    (b) Show that it implies the Fundamental Theorem of Algebra.

4. Calculate the following integrals
   (a) \( \int_0^\infty \frac{\sin x}{x} \, dx \)
   (b) \( \int_0^\infty \frac{x^{\sqrt{2}}}{x+1} \, dx \)

5. Suppose domain \( D \) (of the \( x,y \)-plane) is mapped onto domain \( \Delta \) (of the \( \xi,\eta \)-plane) by an analytic function \( f: \xi + i\eta = f(x + iy) \), and \( f'(x + iy) \neq 0 \) at any point \( (x,y) \in D \).
   (a) Explain why this map preserves “small” shapes (and so, the map can be called *conformal*).
   (b) Explain why this map preserves the form of the Laplace equation.