1. Under what conditions on complex numbers \(a\) and \(b\) the linear function \(ax + by\) is analytic as a function of \(z = x + iy\)?

2. Find the formula for entire analytic functions which have a simple zero at 0. What entire analytic functions have simple zero at \(\infty\)?

3. Let \(f\) be a conformal mapping of a disk. Show that \(f'\) is never equal to 0.

4. Let \(D \subset \mathbb{C}\) is a domain and \(\{f_j\}\) is a sequence of analytic functions on \(D\) such that the functions

\[
g_n(z) = \sum_{j=1}^{n} |f_j(z)|
\]

converge normally on \(D\). Show that the functions

\[
h_n(z) = \sum_{j=1}^{n} |f'_j(z)|
\]

also converge normally on \(D\).