

MATH3XO3 (Complex Analysis) Spring 2010

Problem Set 3

Due on Thursday April 1st by 4pm.

Instructor: Kiumars Kaveh

1.

- (a) Show that the series $\sum_{n=0}^{\infty} 1/(n^2 + z^2)$ converges on the set $\mathbb{C} \setminus \{z = ni \mid n \in \mathbb{Z}\}$.
- (b) Show that the convergence is uniform and absolute on each closed disk contained in this region.

2. Find the radius of convergence of $\sum_{n=0}^{\infty} \frac{z^n}{1+2^n}$.

3. Compute the first four terms of the Taylor series of $1/(1 + e^z)$ around $z_0 = 0$. What is the radius of convergence?

4. Expand $\frac{1}{z(z-1)(z-2)}$ in a Laurent series in the following regions: (a) $0 < |z| < 1$, (b) $1 < |z| < 2$.

Bonus question: Question 2 in Section 3.1, p. 201 in the text book.