

Mathematics 3770H – Complex Analysis

TRENT UNIVERSITY, Winter 2022

Assignment #8 – Corrected

Due on Friday, 18 March.

(May be submitted on paper or via Blackboard.)*

As with all the assignments in this course, unless stated otherwise on the assignment, you are permitted to work together and look things up, so long as you acknowledge the sources you used and the people you worked with.

As noted in Example 8.3 (p. 111) of the text, the Taylor series at 0 of the complex exponential function e^z is $\sum_{n=0}^{\infty} \frac{z^n}{n!}$ and this series is equal to e^z when it converges.

1. Verify that $\sum_{n=0}^{\infty} \frac{z^n}{n!}$ converges for all $z \in \mathbb{C}$. [3.5]
2. Find a power series centred at $1+i$ equal to e^z for all z without taking any derivatives or integrals. [3]
3. Suppose C is the circle in the complex plane centred at 0 and of radius 3, and $k \geq 1$ is an integer. Compute $\int_C \frac{e^z}{(z-1-i)^k} dz$ with the help of the power series you obtained in answering 2. [3.5]

* All else failing, please email your solutions to the instructor at: sbilaniuk@trentu.ca