MTH351 Introduction to Numerical Analysis Summer 2020

Quiz 1 - To be discussed in Lecture Wednesday July 1st

Give yourself 30 - 45 minutes to work on these problems. Write down your own solutions and be ready to discuss them in small group during lecture on Wednesday July 1st. You will have a chance to rewrite your answer if needed. You will need to upload your corrected answers by 6:00 PM, Wednesday July 1st.

Problem 1: Consider the function

$$F(x) = \int_0^x \frac{1 - e^{-t^2}}{t^2} \mathrm{d}t$$

Part I: Using the Taylor series of e^u find the power series representation for the function F.

Part II: Using the ratio test, check that the series you obtained in Part I converges for all $x \in \mathbf{R}$.

Part III: Denote by $S_4(x)$ the polynomial consisting of the first 4 terms of the series you determined in Part I. S_4 should be a polynomial of degree 7.

Estimate the error in approximating $F(x)$ using $S_4(x)$ for $|x| \leq 1$. That is, estimate

$$\max\{|F(x) - S_4(x)|, x \in [-1, 1]\}$$