# ECE 3340 Numerical Methods
Homework 4: Numerical Errors

**Name:**                                                     **ID:**

Solve the following problems from **Chapter 4, Numerical Error**. Use any available space to work out the problem and **place your final solution in the box provided**.

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**Problem 1: Truncation error when calculating $\pi$**

The irrational value $\pi$ can be approximated using the generating function:

$$\pi = 4\sum_{k=0}^{\infty} \frac{(-1)^k}{2k+1}$$

What is the relative error using a 0th, 1st, and 2nd order approximation with 4 digits of precision?

0th order:

1st order:

2nd order:

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**Problem 2: Relative error and ratio scales**

You are developing a new radiocarbon dating method. Your test sample is an Egyptian papyrus document that has been officially dated at 2560 BCE. Your method estimates the date as 2830 BCE. What is the relative error of your method (in percent), assuming that the official date is correct?

$E_r =$