Assignment 1

The due date for submitting this assignment has passed.

As per our normal, you won't be submitted this assignment.

Problem 1: Binary to Decimal

Convert the following numbers from binary to decimal.

1. Number: 1011001001
   Decimal equivalent: 441

Problem 2: Exponent of a number

We computed $a^x$ in the lecture. Let us calculate $a^{-x}$ in this problem in two ways. Note: $a = 1 + \frac{1}{x}$.

3. Compute the value of $a^{1/5}$ using $a = 1.6$ and $a = 5$. Round the result correct to four significant digits. If the answer is 1.0000, please report either 1.000 or 1.0000.

Problem 3: Maclaurin Series

In the video lectures, we computed $e^x$ using Maclaurin series expansion. We will see Maclaurin series to compute some other functions.

6. Compute $e^{sin(x)}$ using the Maclaurin series and both order term.
    In other words, include terms involving $x^2$ or lower order.
    Please report the answer accurate to four significant digits.

Problem 4: Step-wise Use of Taylor's Series

In the text lectures, we made use of step-wise or incremental Taylor's series (truncated to lower order term) to approximate $e^{sin(x)}$ in multiple steps, starting from $0$. We like to use $a = 1$ and $x = 0$ or $x = 0.01$. The $x$-approximation of the $x$-value in steps will lead to the following result, which you should see:

7. Starting with $e^{sin(0)}$ and using $x = 0.5$, compute $e^{sin(0)}$ in a single step. Please report the answer accurate to four significant digits. For example, 1.00000 can be reported either as 1.000 or 1.0000.

8. Starting with $e^{sin(0)}$ and using $x = 0.05$, compute $e^{sin(0)}$ as the first step. Please report the answer accurate to four significant digits.

9. Now you have the value of $e^{10.025}$. Use this value and hence compute the value of $e^{10.005}$. Please report the answer accurate to four significant digits.

10. Starting with $e^{10.005}$ and using $x = 0.05$, compute $e^{10.005}$ as the first step. Please report the answer accurate to four significant digits.

11. Now you have the value of $e^{10.005}$. Use this value and hence compute the value of $e^{10.000}$. Please report the answer accurate to four significant digits.

12. Keeping repeating until you reach $x = 0.0$. This is the value of $e$ using that order approximation of Taylor's series using $x = 0.0$ in six steps. Please report the answer accurate to four significant digits.