Unit 3 - Week 1 - Computation and Error Analysis

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-08-14, 23:59 IST.

Problem 1: Binary to Decimal

Convert the following numbers from binary to decimal:

1) Binary Number: 01011011
Its decimal equivalent is:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 91

0.5 points

2) Binary Number: 0.10110110
Its decimal equivalent is:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.710,0.712

0.5 points

Problem 2: Exponent of a number

We computed $e^{0.5}$ in the lectures. Let us calculate $e^{-1.5}$ in this problem in two ways. Note: $e^x = 1 + x + \frac{x^2}{2!} + \cdots + \frac{x^5}{5!}$

3) Compute the value of $e^{-1.5}$ using $x = -1.5$, using up to fifth order terms. Report the result correct to four significant digits. If the answer is 0.123456, please report either 0.1234 or 0.1235.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.209,0.211

0.5 points

4) Compute $e^{1.5}$ using x=1.5. Then inverse that result to get $e^{-1.5}$. Report the result correct to four significant digits.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.223,0.225

0.5 points

Problem 3: MacLaurin Series

In the video lectures, we computed $e^{0.5}$ using MacLaurin series expansion. We will use MacLaurin series to compute some other functions

5) Compute **sin(0.5)** using MacLaurin series until sixth order term. In other words, include terms involving x^6 or lower orders. Please report the answer accurate to four significant digits

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.478,0.481

0.5 points

6) Compute **cos(0.5)** using MacLaurin series until sixth order term. In other words, include terms involving x^6 or lower orders. Please report the answer accurate to four significant digits

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.876,0.879

0.5 points

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

In the last lecture, we made use of step-wise or sequential Taylor's series (truncated to lower order term) in order to compute $e^{0.5}$ in multiple steps, starting from e^0=1. We will do the same for sin(x) in this problem.

Note that Taylor's series is: $f(a+h) \approx f(a) + hf'(a)$

Thus, we get: $\sin(a+h) \approx \sin(a) + h\cos(a)$A simple substitution will lead to the following result, which you should use:

$$\sin(a+h) = \sin(a) + h\sqrt{1 - \sin^2(a)}$$

7) Starting with sin(0)=0, and using h = 0.5, compute sin(0.5) in a single step. Please report the answer accurate to four significant digits. For example, 0.1230123 may be reported either as 0.123 or 0.1230.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.4999,0.5001

0.5 points

8) Starting with sin(0)=0, and using h = 0.25, compute sin(0.25) as first step. Please report the answer accurate to four significant digits.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.2499,0.2501

0.5 points

9) Now you have the value of sin(0.25). Use this value and hence compute the value of sin(0.5). Please report the answer accurate to four significant digits.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.491,0.493

0.5 points

10) Starting with sin(0)=0, and using h = 0.1, compute sin(0.1) as first step. Please report the answer accurate to four significant digits.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.0999,0.1001

0.5 points

11) Now you have the value of sin(0.1). Use this value and hence compute the value of sin(0.2) as second step. Please report the answer accurate to four significant digits.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.199,0.2

0.5 points

12) Keep repeating until you reach sin(0.5). This is the value of sine using first-order approximation of Taylor's series using h = 0.1 in five-steps. Please report the answer accurate to four significant digits

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.484,0.486

0.5 points