

Show all Work!

Problem 1 25 (pts)

Consider the function $f(x) = e^x$.

- A) Find an expression for $f_2(x)$, the 2nd order truncated Taylor Series expansion of $f(x)$ about a point x_0 . Leave your answer in terms of x_0 .
- B) Find the truncation error $E_T = f(x) - f_2(x)$ at $x = 1.1x_0$. Leave your answer in terms of x_0 .
- C) Find the truncation error when $x_0 = 1$ and $x = 1.1$

Problem 2 (25 pts)

The function $f(x) = e^x(x-1) - (x-1)$ has a root located between 0.5 and 2. Fill in the tables below for the first three iterations of the Bisection Method. Express all answers to four digits after the decimal point.

Iteration	x_l	x_u	x_R	$f(x_l)$	$f(x_R)$	e_A (%)	e_T (%)
1	0.5000	2.0000					
2							
3							

Problem 3 (25 pts)

Consider the equation $f(x) = xe^x - 2 = 0$.

Use the Simple One Point Iteration Method to find the root of $f(x) = 0$. Let $g(x) = 2e^{-x}$ and fill in the table below. Round all numerical answers to 4 places after the decimal point.

i	x_i
0	0.0000
1	
2	
3	
4	
5	

Problem 4 (25 pts)

Consider the function $f(x) = e^x - 2$. The Newton-Raphson Method is used to find the root of $f(x) = 0$.

- a) The initial guess is x_0 . Express x_1 in terms of x_0 . Do not leave your answer in terms of $f(x_0)$ and $f'(x_0)$.
- b) Find x_0 , if $x_1 = x_0 + 1$.