Tutorial 4: Numerical Differentiation and Integration

1. Using Newton's Forward/Backward Differentiation method to find solution

x	0.0	0.1	0.2	0.3	0.4
f(x)	1.0000	0.9975	0.9900	0.9776	0.8604

2. Find Solution of an equation $2x^3-4x+1$ x1=2 and x2=4 x=2.25 step value(h)=0.25 using Newton's Difference Formula (Both Forward and Backward)
3. Using Newton's Divided Difference Formula to find the solution at x=5

x	2	4	9	10
f(x)	4	56	711	980

4. Calculate the integral value of the function given below from x = 1.8 to x = 3.4 using Simpson's 1/3, Simpson's 3/8 & Trapezoidal rule.

x	0.0	0.1	0.2	0.3	0.4
f(x)	1.0000	0.9975	0.9900	0.9776	0.8604

5. Find the following integral using composite trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule and compare the result for using 2 segments,4 segments and 6 Segments ${}_2\int^4 (x^3+2)\,dx$.

6. Find the following integral using composite trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule and compare the result for using 2 segments,4 segments and 6 Segments for ${}_0\int^1 \text{Sinx/x}\,dx$

7. Find the following integral using composite trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule and compare the result for using 8 Segments for ${}_0\int^1 \frac{1}{1+x^2}\,dx$

8. Evaluate the following integration using Romberg integration. $\int_0^1 \frac{sin^2 x}{x}.dx$

9. Evaluate the following integration using Romberg integration. $\int_0^1 \frac{dx}{1+x^3}$.
10. Using Double integral by Trapezoidal and Simpson's 1/3 method find the integration of

$$\iint_0^1 xy^2\,dxdy$$

Note:

1. Hand written/Computer typed Numerical work shall be submitted by 26th of Kartik 2081(11th November 2024).
2. Algorithm and Python/C++ or C (Python Preferred) Code shall be submitted by 3rd of Mangsir 2081.
3. Copying of other's work shall be disqualified for marking.
4. Plagiarism shall be less than 25%.Above 25% will lead to marks deduction. Plag above 50% shall be disqualified.
5. Failed to submission of work by given date shall be disqualified.
6. The time for submission is 11.59.59 PM of the given date.
7. Please write your name and tutorial name during submission (for eg: Rajan_Tutorial_1).You should strictly follow the naming standard.
8. Code shall be submitted as run on IDE and Screenshot shall be submitted.
9. Report format shall be strictly followed to submit the document. Just photos will not be accepted for algorithm and code.
10. NQ will be granted if no assignment are taken into consideration.
11. I was absent in the class won't be the excuses for assignment.

Please submit the assignment to: assignment.bca81@gmail.com

No other medium shall be accepted.

Best of Luck