

**International Islamic University Chittagong**  
**Department of Computer Science & Engineering**

***Lab Assignment -3***

**CSE 4746 Numerical Methods Lab**

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1. The following values of  $f(x)$  are given.  

$x$	1	2	3	4	5
$y = f(x)$	1	8	27	64	125

Write a program to find the first derivative and the second derivative of the function tabulated above at the point  $x = 1$ .
2. The following values of  $f(x)$  are given.  

$x$	1	2	3	4	5
$y = f(x)$	1	8	27	64	125

Write a program to find the first derivative and the second derivative of the function tabulated above at the point  $x = 1.5$ .
3. Write a program to calculate the approximate area under the curve  $y = \int^5 \log_{10} x \, dx$  by using trapezoidal rule.
4. Write a program to calculate the approximate area under the curve  $y = \int^{\pi/2} e^{\sin x} \, dx$  by using Simpson's 1/3 rule.
5. Write a program to calculate the approximate area under the curve  $y = \int^1 x / (1+x^2) \, dx$  by using Simpson's 3/8 rule.
6. Write a program to find the determinant of a 3X3 matrix.
7. Write a program to solve the following system of linear equations by using Matrix inversion method.  

$$\begin{aligned} x + y + z &= 1 \\ x + 2y + 3z &= 6 \\ x + 3y + 4z &= 6 \end{aligned}$$
8. Write a program to solve the following system of linear equations by using Cramer's Rule:  

$$\begin{aligned} 27x + 6y - z &= 85 \\ 6x + 15y + 2z &= 72 \\ x + y + 54z &= 110 \end{aligned}$$
9. Write a program to solve the following system of linear equations by using Gaussian Elimination method.  

$$\begin{aligned} 2x + y + z &= 10 \\ x + 4y + 9z &= 16 \\ 3x + 2y + 3z &= 18 \end{aligned}$$
10. Write a program to solve the following system of linear equations by using Gauss-Jordan Elimination method.  

$$\begin{aligned} x + 2y + z &= 8 \\ 2x + 3y + 4z &= 20 \\ 4x + 3y + 2z &= 16 \end{aligned}$$
11. Write a program to solve the following system of linear equations by using Jacobi's method.  

$$\begin{aligned} 83x + 11y - 4z &= 95 \\ 3x + 8y + 29z &= 71 \\ 7x + 52y + 13z &= 104 \end{aligned}$$
12. Write a program to solve the following system of linear equations by using Gauss-Seidel method.  

$$\begin{aligned} 10x_1 + x_2 + x_3 &= 12 \\ 2x_1 + 10x_2 + x_3 &= 13 \\ 2x_1 + 2x_2 + 10x_3 &= 14 \end{aligned}$$