ASSIGNMENT 1 (AIDS 212)

- Find a root of the equation $x^3 - 4x - 9 = 0$ using bisection method in four stages.

- Find a root of the equation $x = e^{-x}$, correct to three decimal places by secant method.

- Solve the equation $logx = \cos x$ to five decimals by Newton-Raphson Method.

- Using regula-falsi method, compute the real root of $xe^x = 2$.

- Apply the Brent method to find a root of the function $f(x) = x^3 - 6x^2 + 11x - 6$. Choose the interval $[a,b]$ such that $f(a)$ and $f(b)$ have opposite signs. Perform three iterations and provide the estimated root.

ASSIGNMENT 2 (AIDS 212)

- For what value of k the equations

$$x + y + z = 1$$
$$2x + y + 4z = k$$
$$4x + y + 10z = k^2$$

have a solution and solve them completely in each case?

- Solve the following system by Gauss's Elimination Method.

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

- Decompose the matrix A into form LL^T using Cholesky method where

$$A = \begin{bmatrix} 9 & -3 & 3 \\ -3 & 13 & -5 \\ 3 & -5 & 15 \end{bmatrix}$$

- Apply Gauss – Seidal iteration method to solve the following equations:

$54x + y + z = 110;$

$2x + 15y + 6z = 72;$

$-x + 6y + 27z = 85$

- Obtain by power method, the numerically dominant eigen values and eigen vector of the matrix

$$\text{A} = \begin{bmatrix} 15 & -4 & -3 \\ -10 & 12 & -6 \\ -20 & 4 & -2 \end{bmatrix}$$

ASSIGNMENT 3 (AIDS 212)

1.Estimate the following by Trapezoidal Rule:

(i) $\int_1^3 \frac{dx}{x}$ n = 8

(ii) $\int_1^2 \frac{e^x dx}{x}$ n = 4

2.

Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2}\, dx$ by taking 7 ordinates.

3.

The velocity v (km/min) of a moped which starts from rest, is given at fixed intervals of time t (min) as follows:

t:	2	4	6	8	10	12	14	16	18	20
v:	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes.

4.

Solve all Simpson's 1/3rd problems by using Simpson's 3/8th rule.

5.

Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ using Gauss formula for n = 2 and n = 3.

6.

Using three point Gaussian quadrature formula, evaluate $\int_0^1 \frac{dx}{1+x^2}$

ASSIGNMENT 4 (AIDS 212)

1.

Using Euler's method, find an approximate value of y corresponding to x = 1 given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

2.

Given $\frac{dy}{dx} = y - x/y + x$ with initial condition $y = 1$ at $x = 0$; find y for $x = 0.1$ by Euler's method.

3.

Apply Runge – Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

4. Write differences between Initial value problems and Boundary value problems

5.

Consider the following partial differential equations (PDEs):

1. $u_{tt} - 3u_{xx} + 2u_{yy} = 0$
2. $u_{xx} + u_{yy} + u_t = 0$
3. $u_{tt} + 4u_{xx} + 9u_{yy} = 0$
4. $u_{xx} - u_{yy} + 2u_t = 0$
5. $u_{tt} + u_{xx} + u_{yy} - 4u_t = 0$

For each PDE, classify it as hyperbolic, elliptic, or parabolic.