Math Series

C Programming

UG Sem-3 Major (Kalyani University)

Day - 09

Trace of a square Matrix

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

$$tr(A) = a_{11} + a_{22} + a_{33}$$

```c
int n, i, j;
printf("Enter the number of rows/columns: ");
scanf("%d", &n);

int matrix[n][n];
printf("Enter the elements of the matrix:\n");
for(i = 0; i < n; i++){
    for(j = 0; j < n; j++){
        printf("Element [%d][%d]: ", i, j);
        scanf("%d", &matrix[i][j]);
    }
}
```

```c
int trace = 0;
for(i = 0; i < n; i++){
    trace += matrix[i][i];
}

printf("The trace of the matrix is: %d\n", trace);
return 0;
```

Find GCD of two numbers

Greatest Common Divisor

a = 45 = 3 X 3 X 5

b= 30 = 2 X 3 X 5

Common Factors

3 X 5

GCD of 45 and 30 = 15

```
// Euclidean algorithm
while (b != 0) {
    int temp = b;
    b = a % b;
    a = temp;
}
```

Quadratic Equation

If $ax^2 + bx + c = 0$ but $a \neq 0$

then $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

DISCRIMINANT

- $\Rightarrow$ $b^2 - 4ac > 0$ TWO REAL SOLUTIONS
- $\Rightarrow$ $b^2 - 4ac = 0$ ONE REAL SOLUTIONS
- $\Rightarrow$ $b^2 - 4ac < 0$ TWO COMPLEX SOLUTIONS

Infinite Convergent Series

Exponential Series:

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots \frac{x^n}{n!}$$

Sine Series:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots.$$

Cosine Series:

$$\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \ldots.$$