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**Practical 07: Guass Elimination Method**

**Objective:** To find root of the system equation using Guass Elimination method.

**2. Algorithm:**

1. Start

2. Input the matrix of equations in arr[n][n+1] where n is number of unknown variables

3. Making upper triangular Matrix:

for (i = 0; i < n-1; i++)

{

for (j = i+1; j < n; j++)

{

p= arr[j][i] / arr[i][i];

for (k = 0; k < n+1; k++)

{

arr[j][k]= arr[j][k]- p\*arr[i][k];

}

}

}

4. Matrix X[n] , for unknown variables.

5. Backward Substitution:

for(i= n-1; i>=0; i--){

sum=0;

for (j = i+1; j < n; j++)

{

sum= sum+ arr[i][j]\* X[j];

}

X[i]= (arr[i][n]- sum)/arr[i][i];

}

6. Print X

7. Stop

**Code:**

#include<iostream>

using namespace std;

int main(){

int n;

// cout<<"Enter the number of unknown variables: ";

printf("Enter the number of unknown variables: ");

cin>>n;

// scanf("%d", n);

double arr[n][n+1];

double X[n]; // variable array

for (int i = 0; i < n; i++)

{

for (int j = 0; j < n+1; j++)

{

printf("Enter arr[%d][%d]: ", i, j);

scanf("%lf",&arr[i][j]);

}

}

printf("\n\n");

for (int i = 0; i < n; i++)

{

for (int j = 0; j < n+1; j++)

{

printf("%.6lf\t", arr[i][j]);

}

printf("\n");

}

printf("\n\n");

for (int i = 0; i < n-1; i++)

{

for (int j = i+1; j < n; j++)

{

double p= arr[j][i] / arr[i][i];

// printf("%lf\n", p);

for (int k = 0; k < n+1; k++)

{

arr[j][k]= arr[j][k]- p\*arr[i][k];

}

}

}

for (int i = 0; i < n; i++)

{

for (int j = 0; j < n+1; j++)

{

printf("%.6lf\t", arr[i][j]);

}

printf("\n");

}

printf("\n\n");

// upper triangular matrix

// backward substitution

for(int i= n-1; i>=0; i--){

double sum=0;

for (int j = i+1; j < n; j++)

{

sum= sum+ arr[i][j]\* X[j];

}

X[i]= (arr[i][n]- sum)/arr[i][i];

}

printf("The values of unknown variables is: \n");

for (int i = 0; i < n; i++)

{

printf("X[%d]= %lf\n", i, X[i]);

}

}

**Output:**

PS D:\01\_Java\Deepankar\CCpp\CBNST\Practical-07-GuassEliminationMethod> cd "d:\01\_Java\Deepankar\CCpp\CBNST\Practical-07-GuassEliminationMethod\" ; if ($?) { g++ \_02\_GuassEliminationMethod.cpp -o \_02\_GuassEliminationMethod } ; if ($?) { .\\_02\_GuassEliminationMethod }

Enter the number of unknown variables: 3

Enter arr[0][0]: 4

Enter arr[0][1]: 5

Enter arr[0][2]: 6

Enter arr[0][3]: 7

Enter arr[1][0]: 8

Enter arr[1][1]: 9

Enter arr[1][2]: 4

Enter arr[1][3]: 3

Enter arr[2][0]: 4

Enter arr[2][1]: 5

Enter arr[2][2]: 7

Enter arr[2][3]: 5

4.000000 5.000000 6.000000 7.000000

8.000000 9.000000 4.000000 3.000000

4.000000 5.000000 7.000000 5.000000

4.000000 5.000000 6.000000 7.000000

0.000000 -1.000000 -8.000000 -11.000000

0.000000 0.000000 1.000000 -2.000000

The values of unknown variables is:

X[0]= -29.000000

X[1]= 27.000000

X[2]= -2.000000