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Practical 08: Guass Jordan Elimination Method

Objective: To find root of the system equation using Guass Jordan 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 diagonal Matrix:

```
for (i = 0; i < n; i++)  
{  
    for (j = 0; j < n; j++)  
    {  
        p= arr[j][i] / arr[i][i];  
        if(i != k){  
            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. Solution:

```
for(i= n-1; i>=0; i--){  
    X[i]= (arr[i][n])/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");
```

```
// diagonal matrix

for (int i = 0; i < n; i++)
{
    for (int j = 0; j < n; j++)
    {
        double p= arr[j][i] / arr[i][i];
        // printf("%lf\n", p);
        if(i!=j){
            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");
```

```
// solution
```

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

    X[i]= (arr[i][n])/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-08-GuassJordan> cd
"d:\01_Java\Deepankar\CCpp\CBNST\Practical-08-GuassJordan\" ; if ($?) { g++
01_guassJordan.cpp -o 01_guassJordan } ; if ($?) {
.\01_guassJordan }

```

Enter the number of unknown variables: 3

Enter arr[0][0]: 4

Enter arr[0][1]: 5

Enter arr[0][2]: 4

Enter arr[0][3]: 5

Enter arr[1][0]: 3

Enter arr[1][1]: 4

Enter arr[1][2]: 3

Enter arr[1][3]: 4

Enter arr[2][0]: 3

Enter arr[2][1]: 4

Enter arr[2][2]: 5

Enter arr[2][3]: 3

4.000000	5.000000	4.000000	5.000000
3.000000	4.000000	3.000000	4.000000
3.000000	4.000000	5.000000	3.000000

4.000000	0.000000	0.000000	2.000000
0.000000	0.250000	0.000000	0.250000
0.000000	0.000000	2.000000	-1.000000

The values of unknown variables is:

X[0]= 0.500000

X[1]= 1.000000

X[2]= -0.500000