



# PATUAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY

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**COURSE CODE CCE 312**  
**Numerical Methods Sessional**

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## **SUBMITTED TO:**

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Assignment 03

Assignment title: Gaussian Elimination

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# Linear Equations

Sharafat Karim

A linear equation is a mathematical statement that represents a straight line when graphed.

Then let's take input from user, in the following format,

```
Enter number of unknowns: 3
Enter row 1 in the format (ax + by + cz = d)
```

```
# User input (auto)
# N = int(input("Enter number of unknowns: "))

# arr = []
# for i in range(N):
#     arr.append(list(map(int, input().split())))

# User input (manual)
N = 3
arr = [[2, 1, -1, 8], [-3, -1, 2, -11], [-2, 1, 2, -3]]
```

```
# User input's output
print(N)

def print_arr(arr):
    for i in range(N):
        print(arr[i])

print_arr(arr)
```

```
3
[2, 1, -1, 8]
[-3, -1, 2, -11]
[-2, 1, 2, -3]
```

## Gaussian Elimination

```
import copy

def gaussian_elimination(N, arr):
    arr = copy.deepcopy(arr)
    for i in range(N):
        for j in range(N, -1, -1):
            arr[i][j] /= arr[i][0+i]

        for j in range(i+1, N):
            for k in range(N, -1, -1):
                arr[j][k] -= arr[i][k] * arr[j][0+i]

    print_arr(arr)
    print()

    solve = [0 for j in range(N)]
    for i in range(N-1, -1, -1):
        for j in range(N):
            solve[i] = arr[i][N]
            for k in range(i+1, N):
                solve[i] -= arr[i][k] * solve[k]
            solve[i] /= arr[i][i]

    print(solve)

gaussian_elimination(N, arr)
```

```
[1.0, 0.5, -0.5, 4.0]
[0.0, 0.5, 0.5, 1.0]
[0.0, 2.0, 1.0, 5.0]
```

```
[1.0, 0.5, -0.5, 4.0]
[0.0, 1.0, 1.0, 2.0]
[0.0, 0.0, -1.0, 1.0]
```

```
[1.0, 0.5, -0.5, 4.0]
[0.0, 1.0, 1.0, 2.0]
[0.0, 0.0, 1.0, -1.0]
```

```
[2.0, 3.0, -1.0]
```