

Lab-09_08_09_2021(Cramer's rule, Gauss Elimination Method)

September 8, 2021

1 Cramer's Rule

Q. Write a program to solve a system of linear equations using Cramer's rule. $x + 2y - z = 1$
 $2x + y + 4z = 2$ $3x + 3y + 4z = 1$

```
[16]: A = np.matrix([[1,2,-1],[2,1,4],[3,3,4]])
      B = np.matrix([[1],[2],[1]])
      Ax = cp.deepcopy(A)
      Ay = cp.deepcopy(A)
      Az = cp.deepcopy(A)
      Ax[:, 0] = B
      Ay[:, 1] = B
      Az[:, 2] = B
      x = np.linalg.det(Ax)/np.linalg.det(A)
      y = np.linalg.det(Ay)/np.linalg.det(A)
      z = np.linalg.det(Az)/np.linalg.det(A)
      print(" x={:.2f} \n y={:.2f} \n z={:.2f}".format(x,y,z))
```

```
x=7.00
y=-4.00
z=-2.00
```

2 Gauss Elimination Method

Q. Write a program to find the solution of a system of linear equations using Gauss elimination method.

```
[19]: A=np.matrix([[1,2,-1],[2,1,4],[3,3,4]])
      B=np.matrix([[1],[2],[1]])
      AB=np.concatenate((A,B), axis=1)
      m=A.shape[0]
      n=A.shape[1]
      for i in range(m):
          if (AB[i,i]==0):
              k=i+1
              while (AB[k,i]==0):
                  k=k+1
              AB[[i,k]]=AB[[k,i]]
```

```

    AB[i]=AB[i]/AB[i,i]
    for j in range (i+1,m):
        AB[j]= AB[j]-AB[j,i]*AB[i]
z = AB[2,3]/AB[2,2]
y = (AB[1,3]-z*AB[1,2])/AB[1,1]
x = (AB[0,3]-z*AB[0,2]-y*AB[0,1])/AB[0,0]
print("Solution:")
print(" x={:.2f} \n y={:.2f} \n z={:.2f}".format(x,y,z))

```

Solution:

```

x=7.00
y=-4.00
z=-2.00

```