

NM Lab Sheet II Year / II Part Faculty: Computer/Electrical

Labsheet#5

Objectives :

1. To Implement Basic **Gauss Elimination Method** to find solution of following linear simultaneous equations:

$$3x + 2y + 1z = 10$$

$$2x + 3y + 2z = 14$$

$$1x + 2y + 3z = 14$$

$$x = 1, y = 2, z = 3$$

$$4x + 2y + 3z = 4$$

$$2x + 2y + z = 6$$

$$x + y + z = 0$$

$$x = 6, y = 1, z = -6$$

$$3x + 2y - 4z + 3u = 2$$

$$2x + 3y - 3z - u = 1$$

$$x + 2y + 3z - u = 10$$

$$2x - y + 2z + 3u = 7$$

$$x = 1, y = 2, z = 2, u = 1$$

Basic Gauss Elimination - Steps

1. Declare matrix & required variables
2. Enter Augmented Matrix
3. Forward Elimination
 - a. Upper Triangular Matrix
4. Backward Substitution
5. Print Solution/Roots

Gauss Elimination Algorithm

1. Start
2. Declare the variables and read the order of the matrix n.
3. Take the coefficients of the linear equation as:


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      Do for k=1 to n
      Do for j=1 to n+1
          Read a[k][j]
      End for j
      End for k
      
```
4. Do for k=1 to n-1


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      Do for i=k+1 to n
      Do for j=k+1 to n+1
          
$$a[i][j] = a[i][j] - a[i][k] / a[k][k] * a[k][j]$$

      End for j
      End for i
      End for k
      
```
5. Compute $x[n] = a[n][n+1] / a[n][n]$

6. Do for $k=n-1$ to 1
 - sum = 0
 - Do for $j=k+1$ to n
 - $sum = sum + a[k][j] * x[j]$
 - End for j
 - $x[k] = 1/a[k][k] * (a[k][n+1] - sum)$
- End for k
7. Display the result $x[k]$
8. Stop

Lab Assignment#5

1. Solve the following system using Gauss Elimination Method: ($x = 1, y = 2, z = 3$)
 - $2x + 4y - 6z = -18$
 - $x + 3y + z = 10$
 - $2x - 4y - 2z = -12$
2. Solve the following eqⁿs. using GEM with *Partial Pivoting*: (3, -2, 1, 5)
 - $x + 2y - 12z + 8v = 27$
 - $5x + 4y + 7z - 2v = 4$
 - $7y - 3x + 9z + 5v = 11$
 - $6x - 12y - 8z + 3v = 49$
3. Solve the following eqⁿs. using Gauss Elimination with *Partial Pivoting*: (5, 6, -10, 8)
 - $2x_1 + x_2 + x_3 - 2x_4 = -10$
 - $4x_1 + 2x_3 + x_4 = 8$
 - $3x_1 + 2x_2 + 2x_3 = 7$
 - $x_1 + 3x_2 + 2x_3 - x_4 = -5$
4. Solve the following system using Basic Gauss Elimination Method: (Inconsistent)
 - $p + q + r = 150$
 - $p + 2q + 3r = 100$
 - $2p + 3q + 4r = 200$
5. Solve the following system using Gauss Elimination with *Complete Pivoting*: (1, 1, 1)
 - $r - s + 2t = 2$
 - $r - s + t = 1$
 - $2r + 3s - t = 4$