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SE-Comps B/Batch C

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Scilab no.4: Gauss Elimination Method

Program No.1 :- Write a sci lab code to solve the following equations in terms of x, y and z by using the Gauss Elimination Method.

Equations:

$$2x + y - z = 8$$

$$-3x - y + 2z = -11$$

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

Code :-

```
clc();
A=[2 1 -1; -3 -1 2; -2 1 2];
printf("Matrix A : ");
disp(A);
B=[8; -11; -3];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=3;
for i=1:n
    if C(i,i)~=0
        C(i,:)=C(i,:)/C(i,i);
    end
    disp(C);
    for j=i+1:n
        C(j,:)=C(j,:)-C(j,i)*C(i,:);
    end
    disp(C);
end
printf("\nMatrix C : ");
disp(C);
z=C(3,4);
y=C(2,4)-z*C(2,3);
```

```

x=C(1,4)-z*C(1,3)-y*C(1,2);
printf("\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);

```

Output :-

```

Scilab 6.1.1 Console
Matrix A :
  2.   1.  -1.
 -3.  -1.   2.
 -2.   1.   2.
Matrix B :
  8.
 -11.
 -3.
Matrix C :
  2.   1.  -1.   8.
 -3.  -1.   2.  -11.
 -2.   1.   2.  -3.

  1.   0.5  -0.5   4.
 -3.  -1.   2.  -11.
 -2.   1.   2.  -3.

  1.   0.5  -0.5   4.
  0.   0.5   0.5   1.
  0.   2.   1.   5.

  1.   0.5  -0.5   4.
  0.   1.   1.   2.
  0.   2.   1.   5.

  1.   0.5  -0.5   4.
  0.   1.   1.   2.
  0.   0.  -1.   1.

  1.   0.5  -0.5   4.
  0.   1.   1.   2.
  0.   0.   1.  -1.

  1.   0.5  -0.5   4.
  0.   1.   1.   2.
  0.   0.   1.  -1.
Matrix C :
  1.   0.5  -0.5   4.
  0.   1.   1.   2.
  0.   0.   1.  -1.

x = 2
y = 3
z = -1

```

Program No. 2:- Write a sci lab code to solve the following equations in terms of x, y, z and w by using the Gauss Elimination Method.

$$10x - 2y - z - w = 3$$

$$-2x + 10y - z - w = 15$$

$$-x - y + 10z - 2w = 27$$

$$-x - y - 2z + 10w = -9$$

Code:-

```
clc();
A=[10 -2 -1 -1; -2 10 -1 -1; -1 -1 10 -2; -1 -1 -2 10];
printf("Matrix A : ");
disp(A);
B=[3;15;27;-9];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=4;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:)
    else
        C(i,:)=C(i,+)/C(i,i);
    disp(C);
    for j=1:n-1
        if i+j<n+1
            C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
        else
            end
        end
    end
end
end
printf("\nMatrix C : ");
disp(C);
w = C(4, 5);
z = C(3, 5) - w*C(3, 4);
y = C(2, 5) - w*C(2, 4) - z*C(2, 3);
x = C(1, 5) - w*C(1, 4) - z*C(1, 3) - y*C(1, 2);
printf("\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
printf("w = %g\n",w);
```

Output :-

```
Scilab 6.1.1 Console
Matrix A :
  10.  -2.  -1.  -1.
 -2.   10.  -1.  -1.
 -1.  -1.   10.  -2.
 -1.  -1.  -2.   10.
Matrix B :
  3.
 15.
 27.
 -9.
Matrix C :
  10.  -2.  -1.  -1.   3.
 -2.   10.  -1.  -1.   15.
 -1.  -1.   10.  -2.   27.
 -1.  -1.  -2.   10.  -9.

  1. -0.2 -0.1 -0.1  0.3
 -2.  10.  -1.  -1.   15.
 -1. -1.   10.  -2.   27.
 -1. -1.  -2.   10.  -9.

  1. -0.2 -0.1 -0.1  0.3
  0.  1.  -0.125 -0.125  1.625
  0. -1.2  9.9  -2.1  27.3
  0. -1.2 -2.1  9.9  -8.7

  1. -0.2 -0.1 -0.1  0.3
  0.  1.  -0.125 -0.125  1.625
  0.  0.  1.  -0.2307692  3.
  0.  0. -2.25  9.75  -6.75

  1. -0.2 -0.1 -0.1  0.3
  0.  1.  -0.125 -0.125  1.625
  0.  0.  1.  -0.2307692  3.
  0.  0.  0.  1.  9.622D-17
Matrix C :
  1. -0.2 -0.1 -0.1  0.3
  0.  1.  -0.125 -0.125  1.625
  0.  0.  1.  -0.2307692  3.
  0.  0.  0.  1.  9.622D-17
x = 1
y = 2
z = 3
w = 9.62193e-17

--> |
```

Program No. 3 :- Write a sci lab code to solve the following equations in terms of x, y and z by using the Gauss Elimination Method.

$$x - 2y + z = 0$$

$$2x + y - 3z = 5$$

$$4x - 7y + z = -1$$

Code :-

```
clc();
A=[1 -2 1;2 1 -3;4 -7 1];
printf("Matrix A : ");
disp(A);
B=[0;5;-1];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=3;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:);
    else
        C(i,:)=C(i,:)/C(i,i);
        disp(C);
        for j=1:n-1
            if i+j<n+1
                C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
            else
                end
            end
        end
    end
end
printf("Matrix C : ");
disp(C);
z=C(3,4);
y=C(2,4)-z*C(2,3);
x=C(1,4)-z*C(1,3)-y*C(1,2);
printf("\n\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
```

Output :-

```
Scilab 6.1.1 Console
Matrix A :
  1. -2.  1.
  2.  1. -3.
  4. -7.  1.
Matrix B :
  0.
  5.
 -1.
Matrix C :
  1. -2.  1.  0.
  2.  1. -3.  5.
  4. -7.  1. -1.

  1. -2.  1.  0.
  2.  1. -3.  5.
  4. -7.  1. -1.

  1. -2.  1.  0.
  0.  1. -1.  1.
  0.  1. -3. -1.

  1. -2.  1.  0.
  0.  1. -1.  1.
  0.  0.  1.  1.
Matrix C :
  1. -2.  1.  0.
  0.  1. -1.  1.
  0.  0.  1.  1.

x = 3
y = 2
z = 1

-->
```

Program no. 4 :- Write a sci lab code to solve the following equations in terms of x, y and z by using the Gauss Elimination Method.

$$5x - 2y + 3z = -1$$

$$-3x + 9y + z = 2$$

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

Code :-

```
clc();
A=[5 -2 3;-3 9 1;2 -1 -7];
printf("Matrix A : ");
disp(A);
B=[-1;2;3];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=3;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:);
    else
        C(i,:)=C(i,:)/C(i,i);
    disp(C);
    for j=1:n-1
        if i+j<n+1
            C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
        else
            end
        end
    end
end
end
printf("Matrix C : ");
disp(C);
z=C(3,4);
y=C(2,4)-z*C(2,3);
x=C(1,4)-z*C(1,3)-y*C(1,2);
printf("\n\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
```

Output :-

```
Scilab 6.1.1 Console
Matrix A :
  5. -2.  3.
 -3.  9.  1.
  2. -1. -7.
Matrix B :
 -1.
  2.
  3.
Matrix C :
  5. -2.  3. -1.
 -3.  9.  1.  2.
  2. -1. -7.  3.

  1. -0.4  0.6 -0.2
 -3.  9.  1.  2.
  2. -1. -7.  3.

  1. -0.4  0.6 -0.2
  0.  1.  0.3589744  0.1794872
  0. -0.2 -8.2  3.4

  1. -0.4  0.6 -0.2
  0.  1.  0.3589744  0.1794872
  0.  0.  1. -0.4227129
Matrix C :
  1. -0.4  0.6 -0.2
  0.  1.  0.3589744  0.1794872
  0.  0.  1. -0.4227129

x = 0.18612
y = 0.33123
z = -0.422713

--> |
```


Program No. 5 :- Write a sci lab code to solve the following equations in terms of x, y and z by using the Gauss Elimination Method.

$$5x + 4y - z = 0$$

$$10y - 3z = 11$$

$$z = 3$$

Code :-

```
clc();
A=[5 4 -1;0 10 -3;0 0 1];
printf("Matrix A : ");
disp(A);
B=[0;11;3];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=3;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:);
    else
        C(i,:)=C(i,:)/C(i,i);
        disp(C);
        for j=1:n-1
            if i+j<n+1
                C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
            else
                end
            end
        end
    end
end
printf("Matrix C : ");
disp(C);
z=C(3,4);
y=C(2,4)-z*C(2,3);
x=C(1,4)-z*C(1,3)-y*C(1,2);
printf("\n\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
```

Output :-

```
Scilab 6.1.1 Console
Matrix A :
  5.   4.  -1.
  0.  10.  -3.
  0.   0.   1.
Matrix B :
  0.
 11.
  3.
Matrix C :
  5.   4.  -1.   0.
  0.  10.  -3.  11.
  0.   0.   1.   3.

  1.   0.8 -0.2   0.
  0.  10.  -3.  11.
  0.   0.   1.   3.

  1.   0.8 -0.2   0.
  0.   1.  -0.3  1.1
  0.   0.   1.   3.

  1.   0.8 -0.2   0.
  0.   1.  -0.3  1.1
  0.   0.   1.   3.
Matrix C :
  1.   0.8 -0.2   0.
  0.   1.  -0.3  1.1
  0.   0.   1.   3.

x = -1
y = 2
z = 3

--> |
```

Program no. 6 :- Write a sci lab code to solve the following equations in terms of x, y and z by using the Gauss Elimination Method.

$$-3x + 2y - 6z = 6$$

$$5x + 7y - 5z = 6$$

$$x + 4y - 2z = 8$$

Code :-

```
clc();
A=[-3 2 -6;5 7 -5;1 4 -2];
printf("Matrix A : ");
disp(A);
B=[6;6;8];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=3;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:);
    else
        C(i,:)=C(i,:)/C(i,i);
    disp(C);
    for j=1:n-1
        if i+j<n+1
            C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
        else
            end
        end
    end
end
end
printf("Matrix C : ");
disp(C);
z=C(3,4);
y=C(2,4)-z*C(2,3);
x=C(1,4)-z*C(1,3)-y*C(1,2);
printf("\n\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
```

Output :-

```
Scilab 6.1.1 Console
Matrix A :
-3.  2. -6.
 5.  7. -5.
 1.  4. -2.
Matrix B :
 6.
 6.
 8.
Matrix C :
-3.  2. -6.  6.
 5.  7. -5.  6.
 1.  4. -2.  8.

 1. -0.6666667  2. -2.
 5.  7.        -5.  6.
 1.  4.        -2.  8.

 1. -0.6666667  2.        -2.
 0.  1.        -1.4516129  1.5483871
 0.  4.6666667 -4.        10.

 1. -0.6666667  2.        -2.
 0.  1.        -1.4516129  1.5483871
 0.  0.         1.         1.
Matrix C :
 1. -0.6666667  2.        -2.
 0.  1.        -1.4516129  1.5483871
 0.  0.         1.         1.

x = -2
y = 3
z = 1

-->
```

Program No. 7 :- Write a sci lab code to solve the following equations in terms of x, y and z by using the Gauss Elimination Method.

$$\begin{aligned}x + 2y + 3z &= 6 \\ 2x - 3y + 2z &= 14 \\ 3x + y - z &= -2\end{aligned}$$

Code :-

```
clc();
A=[1 2 3;2 -3 2;3 1 -1];
printf("Matrix A : ");
disp(A);
B=[6;14;-2];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=3;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:);
    else
        C(i,:)=C(i,:)/C(i,i);
    disp(C);
    for j=1:n-1
        if i+j<n+1
            C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
        else
            end
        end
    end
end
end
printf("Matrix C : ");
disp(C);
z=C(3,4);
y=C(2,4)-z*C(2,3);
x=C(1,4)-z*C(1,3)-y*C(1,2);
printf("\n\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
```

Output :-

```
Scilab 6.1.1 Console
Matrix A :
  1.  2.  3.
  2. -3.  2.
  3.  1. -1.
Matrix B :
  6.
 14.
 -2.
Matrix C :
  1.  2.  3.  6.
  2. -3.  2. 14.
  3.  1. -1. -2.

  1.  2.  3.  6.
  2. -3.  2. 14.
  3.  1. -1. -2.

  1.  2.  3.      6.
  0.  1.  0.5714286 -0.2857143
  0. -5. -10.      -20.

  1.  2.  3.      6.
  0.  1.  0.5714286 -0.2857143
  0.  0.  1.       3.
Matrix C :
  1.  2.  3.      6.
  0.  1.  0.5714286 -0.2857143
  0.  0.  1.       3.

x = 1
y = -2
z = 3

--> |
```

Program No. 8: Write a sci lab code to solve the following equations in terms of x, y, z and w by using the Gauss Elimination Method.

$$A = \begin{bmatrix} 2 & 1 & 0 & 1 \\ 5 & -4 & 1 & 0 \\ 3 & 0 & 2 & 0 \\ 1 & 1 & -1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 2 \\ 1 \\ -2 \\ 1 \end{bmatrix}$$

Code:

```
clc();
A=[2 1 0 1;5 -4 1 0;3 0 2 0;1 1 -1 1];
printf("Matrix A : ");
disp(A);
B=[2;1;-2;1];
printf("Matrix B : ");
disp(B);
C=[A B];
printf("Matrix C : ");
disp(C);
n=4;
for i=1:n
    if C(i,i)==0
        C(i,:)=C(i,:)
    else
        C(i,:)=C(i,:)/C(i,i);
    disp(C);
    for j=1:n-1
        if i+j<n+1
            C(i+j,:)=C(i+j,:)-C(i+j,i)*C(i,:);
        else
            end
        end
    end
end
end
printf("Matrix C : ");
disp(C);
w = C(4, 5);
z = C(3, 5) - w*C(3, 4);
y = C(2, 5) - w*C(2, 4) - z*C(2, 3);
x = C(1, 5) - w*C(1, 4) - z*C(1, 3) - y*C(1, 2);
printf("\n\nx = %g\n",x);
printf("y = %g\n",y);
printf("z = %g\n",z);
printf("w = %g\n",w);
```

Output:

```
Scilab 6.1.1 Console
Matrix A :
  2.  1.  0.  1.
  5. -4.  1.  0.
  3.  0.  2.  0.
  1.  1. -1.  1.
Matrix B :
  2.
  1.
 -2.
  1.
Matrix C :
  2.  1.  0.  1.  2.
  5. -4.  1.  0.  1.
  3.  0.  2.  0. -2.
  1.  1. -1.  1.  1.

  1.  0.5  0.  0.5  1.
  5. -4.  1.  0.  1.
  3.  0.  2.  0. -2.
  1.  1. -1.  1.  1.

  1.  0.5  0.  0.5  1.
  0.  1. -0.1538462  0.3846154  0.6153846
  0. -1.5  2. -1.5 -5.
  0.  0.5 -1.  0.5  0.

  1.  0.5  0.  0.5  1.
  0.  1. -0.1538462  0.3846154  0.6153846
  0.  0.  1. -0.5217391 -2.3043478
  0.  0. -0.9230769  0.3076923 -0.3076923

  1.  0.5  0.  0.5  1.
  0.  1. -0.1538462  0.3846154  0.6153846
  0.  0.  1. -0.5217391 -2.3043478
  0.  0.  0.  1.  14.
Matrix C :
  1.  0.5  0.  0.5  1.
  0.  1. -0.1538462  0.3846154  0.6153846
  0.  0.  1. -0.5217391 -2.3043478
  0.  0.  0.  1.  14.

x = -4
y = -4
z = 5
w = 14

--> |
```