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Scilab No. : 5

Title: Gauss Elimination Method

Program 1: Write a scilab code to solve the following set of equations in terms of x, y, z by using gauss elimination method

$$x + y + z = 3, x + 2y + 3z = 0, x + 3y + 2z = 3$$

Code:

```
clc;
clear all;
a = [1, 1, 1; 1, 2, 3; 1, 3, 2];
disp(a);
b = [3; 0; 3];
disp(b);
c = [a b];
disp(c);
n = 3;
for i = 1:n;
    if c(i, i) == 0
        c(i, :) = c(i, :) + c(i, n+1);
    else
        c(i, :) = c(i, :) / c(i, i);
    end
    disp(c);
    for j = 1:n-1
        if i + j < n + 1
            c(i + j, :) = c(i + j, :) - c(i + j, i) * c(i, :);
        end
    end
end
disp(c);
z = c(3,4);
y = c(2,4) - c(2,3) * z;
x = c(1,4) - c(1,3) * z - c(1,2) * y;
printf("x = ");
disp(x);
printf("y = ");
disp(y);
printf("z = ");
disp(z);
```

Output:

1.	1.	1.
1.	2.	3.
1.	3.	2.

3.
0.
3.

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

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

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

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

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

x =
4.

y =
1.

z =
-2.

Program 2: Write a scilab code to solve the following set of equations in terms of x, y, z and w by using gauss elimination method

Code:

```
clc;
clear all;
a = [2 1 0 1; 5 -4 1 0; 3 0 2 0; 1 1 -1 1];
disp(a);
b = [2; 1; -2; 1];
disp(b);
c = [a b];
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);
    end
    disp(c);
    for j = 1:n-1
        if i + j < n + 1
            c(i + j, :) = c(i + j, :) - c(i + j, i) * c(i, :);
        end
    end
end
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("x = ");
disp(x);
printf("y = ");
disp(y);
printf(" z = ");
disp(z);
printf("w = ");
disp(w);
```

Output:

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

```
2.
1.
-2.
1.
```

```
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.	-0.9230769	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.

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.

Program 3: Write a scilab code to solve the following set of equations in terms of x_1 , x_2 , x_3 , x_4 by using gauss elimination method

Code:

```
clc;
clear all;
a = [4 1 1 1; 1 5 2 1; 2 -3 3 2; 3 1 -1 5];
disp(a);
b = [2.4; 0.7; 3.5; 2.7];
disp(b);
c = [a b];
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);
    end
    disp(c);
    for j = 1:n-1
        if i + j < n + 1
            c(i + j, :) = c(i + j, :) - c(i + j, i) * c(i, :);
        end
    end
end
disp(c);
x4 = c(4, 5);
x3 = c(3, 5) - x4 * c(3, 4);
x2 = c(2, 5) - x4 * c(2, 4) - x3 * c(2, 3);
x1 = c(1, 5) - x4 * c(1, 4) - x3 * c(1, 3) - x2 * c(1, 2);
printf("x1 = ");
disp(x1);
printf("x2 = ");
disp(x2);
printf("x3 = ");
disp(x3);
printf("x4 = ");
disp(x4);
```

Output:

```
4.  1.  1.  1.
1.  5.  2.  1.
2. -3.  3.  2.
3.  1. -1.  5.
```

```
2.4
0.7
3.5
2.7
```

```
4.  1.  1.  1.  2.4
1.  5.  2.  1.  0.7
2. -3.  3.  2.  3.5
3.  1. -1.  5.  2.7
```

```
1.  0.25  0.25  0.25  0.6
1.  5.    2.    1.    0.7
2. -3.    3.    2.    3.5
3.  1.   -1.    5.    2.7
```

```
1.  0.25  0.25      0.25      0.6
0.  1.    0.3684211  0.1578947  0.0210526
0. -3.5   2.5       1.5       2.3
0.  0.25 -1.75     4.25      0.9
```

```
1.  0.25  0.25      0.25      0.6
0.  1.    0.3684211  0.1578947  0.0210526
0.  0.    1.        0.5416667  0.6263889
0.  0.   -1.8421053  4.2105263  0.8947368
```

0.	1.	1.	0.	0.
1.	0.25	0.25	0.25	0.6
0.	1.	0.3684211	0.1578947	0.0210526
0.	-3.5	2.5	1.5	2.3
0.	0.25	-1.75	4.25	0.9

1.	0.25	0.25	0.25	0.6
0.	1.	0.3684211	0.1578947	0.0210526
0.	0.	1.	0.5416667	0.6263889
0.	0.	-1.8421053	4.2105263	0.8947368

1.	0.25	0.25	0.25	0.6
0.	1.	0.3684211	0.1578947	0.0210526
0.	0.	1.	0.5416667	0.6263889
0.	0.	0.	1.	0.3933333

1.	0.25	0.25	0.25	0.6
0.	1.	0.3684211	0.1578947	0.0210526
0.	0.	1.	0.5416667	0.6263889
0.	0.	0.	1.	0.3933333

x1 =
0.4466667
x2 =
-0.1933333
x3 =
0.4133333
x4 =
0.3933333

Program 4: Write a scilab code to solve the following set of equations in terms of x, y, z by using gauss elimination method

Code:

```
clc;
clear all;
a = [2 1 -1; -3 -1 2; -2 1 2];
disp(a);
b = [8; -11; -3];
disp(b);
c = [a b];
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);
    end
    disp(c);
    for j = 1:n-1
        if i + j < n + 1
            c(i + j, :) = c(i + j, :) - c(i + j, i) * c(i, :);
        end
    end
end
disp(c);
z = c(3,4);
y = c(2,4) - c(2,3) * z;
x = c(1,4) - c(1,3) * z - c(1,2) * y;
printf("x = ");
disp(x);
printf("y = ");
disp(y);
printf("z = ");
disp(z);
```

Output:

```
  2.   1.  -1.
-3.  -1.   2.
-2.   1.   2.

  8.
-11.
-3.

  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.   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.
x =
  2.
y =
  3.
z =
-1.
```