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Scilab No. : 7

Title: **Gauss Seidel Method**

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

$$27x + 6y - z = 85,\ 6x + 15y + 2z = 72,\ x + y + 54z = 110$$

Code:

```
clc;
clear all;
A = [27, 6, -1; 6, 15, 2; 1, 1, 54];
B = [85; 72; 110];
n = 5;
x = 0;
y = 0;
z = 0;
for i=1:n
   printf("\nIteration number = %g", i);
   x = (B(1) - (A(1, 2) * y) - (A(1,3) * z)) / A(1,1);
   y = (B(2) - (A(2, 1) * x) - (A(2,3) * z)) / A(2,2);
   z = (B(3) - (A(3, 1) * x) - (A(3,2) * y)) / A(3,3);
   printf("\nValue of x = %g", x);
   printf("\nValue of y = %g", y);
   printf("\nValue of z = %g", z);
   printf("\n----------------");
end;
```

Output:

```
Iteration number = 1
Value of x = 3.14815
Value of y = 3.54074
Value of z = 1.91317
---------------
Iteration number = 2
Value of x = 2.43217
Value of y = 3.57204
Value of z = 1.92585
---------------
Iteration number = 3
Value of x = 2.42569
Value of y = 3.57294
Value of z = 1.92595
---------------
Iteration number = 4
Value of x = 2.42549
Value of y = 3.57301
Value of z = 1.92595
---------------
Iteration number = 5
Value of x = 2.42548
Value of y = 3.57302
Value of z = 1.92595
---------------
-->
```

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

$$10x + y + z = 12,\ 2x + 10y + z = 13,\ 2x + 2y + 10z = 14$$

Code:

```
clc;
clear all;
A = [10, 1, 1; 2, 10, 1; 2, 2, 10];
B = [12; 13; 14];
n = 5;
x = 0;
y = 0;
z = 0;
for i=1:n
   printf("\nIteration number = %g", i);
   x = (B(1) - (A(1, 2) * y) - (A(1,3) * z)) / A(1,1);
   y = (B(2) - (A(2, 1) * x) - (A(2,3) * z)) / A(2,2);
   z = (B(3) - (A(3, 1) * x) - (A(3,2) * y)) / A(3,3);
   printf("\nValue of x = %g", x);
   printf("\nValue of y = %g", y);
   printf("\nValue of z = %g", z);
   printf("\n----------------");
end;
```

Output:

```
Iteration number = 1
Value of x = 1.2
Value of y = 1.06
Value of z = 0.948
---------------
Iteration number = 2
Value of x = 0.9992
Value of y = 1.00536
Value of z = 0.999088
---------------
Iteration number = 3
Value of x = 0.999555
Value of y = 1.00018
Value of z = 1.00005
---------------
Iteration number = 4
Value of x = 0.999977
Value of y = 0.999999
Value of z = 1
---------------
Iteration number = 5
Value of x = 1
Value of y = 1
Value of z = 1
---------------
```

Program 3: Write a scilab code to solve the following set of equations in terms of x, y, z and w by using gauss seidel method

$$16x + 2y + 3z + 8w = 46,\ 2x + 15y + 4z + 7w = 52,\ 9x + 7y + 22z + 8w = 63,\ 3x + 2y + z + 14w = 71$$

Code:

```
clc;
clear all;
A = [16 2 3 8; 2 15 4 7; 9 7 22 8; 3 2 1 14];
B = [46; 52; 63; 71];
n = 5;
x = 0;
y = 0;
z = 0;
w = 0;
for i=1:n
   printf("\nIteration number = %g", i);
   x = (B(1) - (A(1, 2) * y) - (A(1,3) * z) - (A(1, 4) * w)) / A(1,1);
   y = (B(2) - (A(2, 1) * x) - (A(2,3) * z) - (A(2, 4) * w)) / A(2,2);
   z = (B(3) - (A(3, 1) * x) - (A(3,2) * y) - (A(3, 4) * w)) / A(3,3);
   w = (B(4) - (A(4, 1) * x) - (A(4,2) * y) - (A(4, 3) * w)) / A(4,4);
   printf("\nValue of x = %g", x);
   printf("\nValue of y = %g", y);
   printf("\nValue of z = %g", z);
   printf("\nValue of w = %g", w);
   printf("\n----------");
end;
```

Output:

```
Iteration number = 1
Value of x = 2.875
Value of y = 3.08333
Value of z = 0.706439
Value of w = 4.01488
---------------
Iteration number = 2
Value of x = 0.349685
Value of y = 1.35805
Value of z = 0.828521
Value of w = 4.51571
---------------
Iteration number = 3
Value of x = 0.29204
Value of y = 1.09946
Value of z = 0.752261
Value of w = 4.52923
---------------
Iteration number = 4
Value of x = 0.331903
Value of y = 1.10817
Value of z = 0.728265
Value of w = 4.51848
---------------
Iteration number = 5
Value of x = 0.340689
Value of y = 1.11841
Value of z = 0.725321
Value of w = 4.5159
---------------
```

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

$$20x + 2y + 3z + 6w = 42,\ 2x + 15y + 4z + 4w = 48,\ 2x + 7y + 15z + 4w = 110,\ 3x + 3y + z + 9w = 69$$

Code:

```
clc;
clear all;
A = [20 2 3 6; 2 15 4 4; 2 7 15 4; 3 3 1 9];
B = [42; 48; 110; 69];
n = 5;
x = 0;
y = 0;
z = 0;
w = 0;
for i=1:n
   printf("\nIteration number = %g", i);
   x = (B(1) - (A(1, 2) * y) - (A(1,3) * z) - (A(1, 4) * w)) / A(1,1);
   y = (B(2) - (A(2, 1) * x) - (A(2,3) * z) - (A(2, 4) * w)) / A(2,2);
   z = (B(3) - (A(3, 1) * x) - (A(3,2) * y) - (A(3, 4) * w)) / A(3,3);
   w = (B(4) - (A(4, 1) * x) - (A(4,2) * y) - (A(4, 3) * w)) / A(4,4);
   printf("\nValue of x = %g", x);
   printf("\nValue of y = %g", y);
   printf("\nValue of z = %g", z);
   printf("\nValue of w = %g", w);
   printf("\n----------------");
end;
```

Output:

```
Iteration number = 1
Value of x = 2.1
Value of y = 2.92
Value of z = 5.69067
Value of w = 5.99333
---------------
Iteration number = 2
Value of x = -0.8436
Value of y = 0.196747
Value of z = 5.75578
Value of w = 7.21636
---------------
Iteration number = 3
Value of x = -0.947949
Value of y = -0.132843
Value of z = 5.59736
Value of w = 7.22511
---------------
Iteration number = 4
Value of x = -0.893853
Value of y = -0.100145
Value of z = 5.57255
Value of w = 7.19521
---------------
Iteration number = 5
Value of x = -0.884431
Value of y = -0.086812
Value of z = 5.57305
Value of w = 7.19095
---------------
-->
```