Shubhan Singh

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SE-Comps B/Batch C

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Scilab no.6: Gauss Seidel Method

Program No.1 :- Write a Scilab code to solve the equations in terms of x,y,z by using gauss seidel method performing 5 iterations.

27x+6y-z=85

6x+15y+2z=72

x+y+z+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)
end
```

Output :-

Scilab 6.1.1 Console

```
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 No. 2:- Write a Scilab code to solve the equations in terms of x,y,z by using gauss seidel method performing 7 iterations.

28x+4y-z=32

2x+17y+4z=35

x+3y+10z=24

Code:-

```
clc;
clear all
A=[28 4 -1; 2 17 4; 1 3 10]
B=[32; 35; 24];
n=7;
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)
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration number 1
Value of x : 1.14286
Value of y : 1.92437
Value of z : 1.7084
Iteration number 2
Value of x : 0.928962
Value of y : 1.54756
Value of z : 1.84284
Iteration number 3
Value of x : 0.987593
Value of y : 1.50903
Value of z : 1.84853
Iteration number 4
Value of x : 0.993301
Value of y : 1.50702
Value of z : 1.84857
Iteration number 5
Value of x : 0.993589
Value of y : 1.50697
Value of z : 1.84855
Iteration number 6
Value of x : 0.993595
Value of y : 1.50698
Value of z : 1.84855
Iteration number 7
Value of x : 0.993594
Value of y : 1.50698
Value of z : 1.84855
-->
```

Program No. 3 :- Write a Scilab code to solve the equations in terms of x,y,z,w by using gauss seidel method performing 10 iterations

20x+2y+3z+6w=42

2x+15y+4z+4w=48

2x+7y+15z+4w=110

3x+3y+z+9w=69

Code :-

```
clc
A = [20 2 3 6; 2 15 4 4; 2 7 15 4; 3 3 1 9];
B = [42;48;110;69];
x = 0;
y = 0;
z = 0;
w = 0;
n=10;
for i = 1: n
   printf("\nIteration :%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)*z)/A(4,4)
   printf("\nThe value of x is :%g",x)
   printf("\nThe value of y is :%g",y)
   printf("\nThe value of z is :%g",z)
   printf("\nThe value of w is :%g",w)
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration :1
The value of x is :2.1
The value of y is :2.92
The value of z is :5.69067
The value of w is :5.36104
Iteration :2
The value of x is :-0.653911
The value of y is :0.340067
The value of z is :5.83221
The value of w is :7.12326
Iteration :3
The value of x is :-0.945816
The value of y is :-0.128684
The value of z is :5.61996
The value of w is :7.40039
Iteration :4
The value of x is :-0.950243
The value of y is :-0.145395
The value of z is :5.55445
The value of w is :7.41472
Iteration :5
The value of x is :-0.943043
The value of y is :-0.132705
The value of z is :5.54374
The value of w is :7.40928
Iteration :6
The value of x is :-0.941074
The value of y is :-0.128662
The value of z is :5.54304
The value of w is :7.40735
Iteration :7
The value of x is :-0.940796
The value of y is :-0.128
The value of z is :5.54321
The value of w is :7.40702
Iteration :8
The value of x is :-0.940788
The value of y is :-0.127957
The value of z is :5.54328
The value of w is :7.40699
Iteration :9
The value of x is :-0.940795
The value of y is :-0.127967
The value of z is :5.54329
The value of w is :7.407
Iteration :10
The value of x is :-0.940797
The value of y is :-0.127971
The value of z is :5.54329
The value of w is :7.407
-->
```

Program no. 4 :- Write a Scilab code to solve the equations in terms of x,y,z,w by using gauss seidel method performing 11 iterations

225x+120y+z=698
127x+150y+3z=630
240x+y+80z=434

Code :-

```
clc;
clear all
A=[225 120 1; 127 150 3; 240 1 80]
B=[698; 630; 434];
n=11;
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)
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration number 1
Value of x : 3.10222
Value of y : 1.57345
Value of z : -3.90133
Iteration number 2
Value of x : 2.28039
Value of y : 2.3473
Value of z : -1.4455
Iteration number 3
Value of x : 1.85675
Value of y : 2.65686
Value of z : -0.178473
Iteration number 4
Value of x : 1.68602
Value of y : 2.77607
Value of z : 0.332226
Iteration number 5
Value of x : 1.62018
Value of y : 2.82161
Value of z : 0.529203
Iteration number 6
Value of x : 1.59501
Value of y : 2.83897
Value of z : 0.604473
Iteration number 7
Value of x : 1.58542
Value of y : 2.84559
Value of z : 0.633177
Iteration number 8
Value of x : 1.58176
Value of y : 2.84811
Value of z : 0.644119
Iteration number 9
Value of x : 1.58037
Value of y : 2.84907
Value of z : 0.648289
Iteration number 10
Value of x : 1.57983
Value of y : 2.84944
Value of z : 0.649878
Iteration number 11
Value of x : 1.57963
Value of y : 2.84958
Value of z : 0.650484
-->
```

Program No. 5 :- Write a Scilab code to solve the equations in terms of x,y,z by using gauss seidel method performing 7 iterations

4x-2y-z= 40
x-6y+2z= -28
x-2y+12z= -86

Code :-

```
clc
clear all
A = [4 -2 -2; 1 -6 2; 1 -2 12]
B = [40; -28; -86]
x = 0
y = 0
z = 0
n = 7
for i = 1:n
   printf("\nIteration:%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("\nThe value of x is %g" , x);
   printf("\nThe value of y is %g", y);
   printf("\nThe value of z is %g" , z);
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration:1
The value of x is 10
The value of y is 6.33333
The value of z is -6.94444
Iteration:2
The value of x is 9.69444
The value of y is 3.96759
The value of z is -7.31327
Iteration:3
The value of x is 8.32716
The value of y is 3.61677
The value of z is -7.2578
Iteration:4
The value of x is 8.17948
The value of y is 3.61065
The value of z is -7.24652
Iteration:5
The value of x is 8.18207
The value of y is 3.61484
The value of z is -7.24603
Iteration:6
The value of x is 8.1844
The value of y is 3.61539
The value of z is -7.24614
Iteration:7
The value of x is 8.18463
The value of y is 3.61539
The value of z is -7.24615
-->
```

Program No. 6 :- Write a Scilab code to solve the equations in terms of x,y,z by using gauss seidel method performing 10 iterations
25x+2y+z=69
2x+10y+z=63
x+y+z=43

Code :-

```
clc
clear all
A = [25 2 1; 2 10 1; 1 1 1]
B = [69; 63; 43]
x = 0
y = 0
z = 0
n = 10
for i = 1:n
   printf("\nIteration:%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("\nThe value of x is %g",x)
   printf("\nThe value of y is %g",y)
   printf("\nThe value of z is %g",z)
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration:1
The value of x is 2.76

The value of y is 5.748
The value of z is 34.492
Iteration:2
The value of x is 0.92048
The value of y is 2.6667
The value of z is 39.4128
Iteration:3
The value of x is 0.970151
The value of y is 2.16469
The value of z is 39.8652
Iteration:4
The value of x is 0.992219
The value of y is 2.11504
The value of z is 39.8927
Iteration:5
The value of x is 0.995087
The value of y is 2.11171
The value of z is 39.8932
Iteration:6
The value of x is 0.995335
The value of y is 2.11161
The value of z is 39.8931
Iteration:7
The value of x is 0.995349
The value of y is 2.11162
The value of z is 39.893
Iteration:8
The value of x is 0.995349
The value of y is 2.11163
The value of z is 39.893
Iteration:9
The value of x is 0.995349
The value of y is 2.11163
The value of z is 39.893
Iteration:10
The value of x is 0.995349
The value of y is 2.11163
The value of z is 39.893
-->
```

Program No. 7 :- Write a Scilab code to solve the equations in terms of x,y,z by using gauss seidel method performing 7 iterations

15x+y+z=17
2x+15y+z=18
x+2y+55z=18

Code :-

```
clc
clear all
A = [15 1 1; 2 15 1; 1 2 55]
B = [17; 18; 18]
x = 0
y = 0
z = 0
n = 7
for i = 1:n
   printf("\nIteration:%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("\nThe value of x is %g",x)
   printf("\nThe value of y is %g",y)
   printf("\nThe value of z is %g",z)
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration:1
The value of x is 1.13333
The value of y is 1.04889
The value of z is 0.268525
Iteration:2
The value of x is 1.04551
The value of y is 1.0427
The value of z is 0.270347
Iteration:3
The value of x is 1.0458
The value of y is 1.04254
The value of z is 0.270348
Iteration:4
The value of x is 1.04581
The value of y is 1.04254
The value of z is 0.270348
Iteration:5
The value of x is 1.04581
The value of y is 1.04254
The value of z is 0.270348
Iteration:6
The value of x is 1.04581
The value of y is 1.04254
The value of z is 0.270348
Iteration:7
The value of x is 1.04581
The value of y is 1.04254
The value of z is 0.270348
-->
```

Program No. 8 :- Write a Scilab code to solve the equations in terms of x,y,z,w by using gauss seidel method performing 11 iterations

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

Code :-

```
clc;
A=[16 2 3 8;2 15 4 7;9 7 22 8;3 2 1 14];
B=[46;52;63;71];
n=11;
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)*z)/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);
   x=X;
   y=Y;
   z=Z;
   w=W
end
```

Output :-

Scilab 6.1.1 Console

```
Iteration :1
The value of x is :2.875
The value of y is :3.08333
The value of z is :0.706439
The value of w is :3.96442
Iteration :2
The value of x is :0.374915
The value of y is :1.37823
The value of z is :0.830126
The value of w is :4.7349
Iteration :3
The value of x is :0.17962
The value of y is :1.01173
The value of z is :0.746458
The value of w is :4.83509
Iteration :4
The value of x is :0.191029
The value of y is :0.985766
The value of z is :0.713621
The value of w is :4.8387
Iteration :5
The value of x is :0.198627
The value of y is :0.991825
The value of z is :0.707273
The value of w is :4.83666
Iteration :6
The value of x is :0.20008
The value of y is :0.994277
The value of z is :0.70664
The value of w is :4.83604
Iteration :7
The value of x is :0.2002
The value of y is :0.994717
The value of z is :0.706675
The value of w is :4.83595
Iteration :8
The value of x is :0.200184
The value of y is :0.994752
The value of z is :0.706704
The value of w is :4.83595
Iteration :9
The value of x is :0.200176
The value of y is :0.994748
The value of z is :0.70671
The value of w is :4.83595
Iteration :10
The value of x is :0.200175
The value of y is :0.994745
The value of z is :0.70671
The value of w is :4.83595
-->
```