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SE-Comps B/Batch C

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Scilab no.5: Gauss Jacobi Method

Program No.1 :- Solve using Gauss – Jacobi. Perform 7 iterations.

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

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

$2x – y - 7z = 3$

Code :-

```
clc;
A=[5 -2 3;-3 9 1;2 -1 -7];
B=[-1; 2; 3];
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);
  x=X;
  y=Y;
  z=Z;
end
```

Output :-

```
Scilab 6.1.1 Console

Iteration number 1
Value of x=-0.2
Value of y=0.222222
Value of z=-0.428571
Iteration number 2
Value of x=0.146032
Value of y=0.203175
Value of z=-0.51746
Iteration number 3
Value of x=0.191746
Value of y=0.328395
Value of z=-0.415873
Iteration number 4
Value of x=0.180882
Value of y=0.332346
Value of z=-0.4207
Iteration number 5
Value of x=0.185359
Value of y=0.329261
Value of z=-0.424369
Iteration number 6
Value of x=0.186326
Value of y=0.33116
Value of z=-0.422649
Iteration number 7
Value of x=0.186054
Value of y=0.331292
Value of z=-0.422644
-->
```

Program No. 2:- Solve using Gauss – Jacobi. Perform 10 iterations.

$10x - 2y – z - w = 3$

$-2x + 10y - z -w = 14$

$-x – y + 10z -2w = 27$

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

Code:-

```
clc;
A=[10 -2 -1 -1;-2 10 -1 -1;-1 -1 10 -2;-1 -1 -2 10];
B=[3;15;27;-9];
n=10;
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 number 1
Value of x=0.3
Value of y=1.5
Value of z=2.7
Value of w=-0.9
Iteration number 2
Value of x=0.78
Value of y=1.74
Value of z=2.7
Value of w=-0.18
Iteration number 3
Value of x=0.9
Value of y=1.908
Value of z=2.916
Value of w=-0.108
Iteration number 4
Value of x=0.9624
Value of y=1.9608
Value of z=2.9592
Value of w=-0.036
Iteration number 5
Value of x=0.98448
Value of y=1.9848
Value of z=2.98512
Value of w=-0.01584
Iteration number 6
Value of x=0.993888
Value of y=1.99382
Value of z=2.99376
Value of w=-0.006048
Iteration number 7
Value of x=0.997536
Value of y=1.99755
Value of z=2.99756
Value of w=-0.0024768

Iteration number 8
Value of x=0.999018
Value of y=1.99902
Value of z=2.99901
Value of w=-0.0009792
Iteration number 9
Value of x=0.999607
Value of y=1.99961
Value of z=2.99961
Value of w=-0.000393984
Iteration number 10
Value of x=0.999843
Value of y=1.99984
Value of z=2.99984
Value of w=-0.000157133
-->
```

Program No. 3 :- Solve using Gauss – Jacobi. Perform 10 iterations.

10x + y + z = 12

x + 10y + z = 12

x + y + 10z = 12

Code :-

```
clc;
A=[10 1 1;1 10 1;1 1 10];
B=[12; 12; 12];
n=10;
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);
    x=X;
    y=Y;
    z=Z;
end
```

Output :-

```
Scilab 6.1.1 Console

Iteration number 1
Value of x=1.2
Value of y=1.2
Value of z=1.2
Iteration number 2
Value of x=0.96
Value of y=0.96
Value of z=0.96
Iteration number 3
Value of x=1.008
Value of y=1.008
Value of z=1.008
Iteration number 4
Value of x=0.9984
Value of y=0.9984
Value of z=0.9984
Iteration number 5
Value of x=1.00032
Value of y=1.00032
Value of z=1.00032
Iteration number 6
Value of x=0.999936
Value of y=0.999936
Value of z=0.999936
Iteration number 7
Value of x=1.00001
Value of y=1.00001
Value of z=1.00001
Iteration number 8
Value of x=0.999997
Value of y=0.999997
Value of z=0.999997
Iteration number 9
Value of x=1
Value of y=1
Value of z=1
Iteration number 10
Value of x=1
Value of y=1
Value of z=1
-->
```

Program no. 4 :- Solve using Gauss – Jacobi. Perform 10 iterations.

15x - 2y + 3z = 16
3x + 19y + y = 29
2x – y + 27z = 31

Code :-

```
clc;
A=[15 -2 3;3 19 1;2 -1 27];
B=[16;29;31];
n=10;
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);
    x=X;
    y=Y;
    z=Z;
end
```

Output :-

```
Scilab 6.1.1 Console

Iteration number 1
Value of x=1.06667
Value of y=1.52632
Value of z=1.14815
Iteration number 2
Value of x=1.04055
Value of y=1.29747
Value of z=1.12567
Iteration number 3
Value of x=1.01453
Value of y=1.30277
Value of z=1.11912
Iteration number 4
Value of x=1.01654
Value of y=1.30723
Value of z=1.12125
Iteration number 5
Value of x=1.01671
Value of y=1.3068
Value of z=1.12126
Iteration number 6
Value of x=1.01665
Value of y=1.30677
Value of z=1.12124
Iteration number 7
Value of x=1.01666
Value of y=1.30678
Value of z=1.12124
Iteration number 8
Value of x=1.01666
Value of y=1.30678
Value of z=1.12124
Iteration number 9
Value of x=1.01666
Value of y=1.30678
Value of z=1.12124
Iteration number 10
Value of x=1.01666
Value of y=1.30678
Value of z=1.12124
-->
```

Program No. 5 :- Solve using Gauss – Jacobi. Perform 11 iterations.

110x + y + z = 13
4x + 140y + z = 14
6x + y + 210z = 15

Code :-

```
clc;
A=[110 1 1;4 140 1;6 1 210];
B=[13;14;15];
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);
    x=X;
    y=Y;
    z=Z;
end
```

Output :-

```
Scilab 6.1.1 Console

Iteration number 1
Value of x=0.118182
Value of y=0.1
Value of z=0.0714286
Iteration number 2
Value of x=0.116623
Value of y=0.0961132
Value of z=0.0675758
Iteration number 3
Value of x=0.116694
Value of y=0.0961852
Value of z=0.0676388
Iteration number 4
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676364
Iteration number 5
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365
Iteration number 6
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365
Iteration number 7
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365
Iteration number 8
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365
Iteration number 9
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365

Iteration number 10
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365
Iteration number 11
Value of x=0.116693
Value of y=0.0961828
Value of z=0.0676365
--> |
```

Program No. 6 :- Write a scilab code to solve the following equations in terms of x,y,z by using gauss jacobi method for 10 iterations

25x+2y+z=69
2x+10y+z=63
x+y+70z=43

Code :-

```
clc;
A=[25 2 1;2 10 1;1 1 70];
B=[69;63;43];
n=10;
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);
    x=X;
    y=Y;
    z=Z;
end
```

Output :-

```
Iteration number 1
Value of x=2.76
Value of y=6.3
Value of z=0.614286
Iteration number 2
Value of x=2.23143
Value of y=5.68657
Value of z=0.484857
Iteration number 3
Value of x=2.28568
Value of y=5.80523
Value of z=0.501171
Iteration number 4
Value of x=2.27553
Value of y=5.79275
Value of z=0.498701
Iteration number 5
Value of x=2.27663
Value of y=5.79502
Value of z=0.499025
Iteration number 6
Value of x=2.27644
Value of y=5.79477
Value of z=0.498976
Iteration number 7
Value of x=2.27646
Value of y=5.79481
Value of z=0.498983
Iteration number 8
Value of x=2.27646
Value of y=5.79481
Value of z=0.498982
Iteration number 9
Value of x=2.27646
Value of y=5.79481
Value of z=0.498982
Iteration number 10
Value of x=2.27646
Value of y=5.79481
Value of z=0.498982
-->
```

Program No. 7 :- Write a scilab code to solve the following equations in terms of x,y,z by using gauss jacobi method for 10 iterations

225x+12y+z=697
12x+50y+z=630
40x+y+70z=431

Code :-

```
clc;
A=[225 12 1;12 50 1;40 1 70];
B=[697;630;431];
n=10;
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);
    x=X;
    y=Y;
    z=Z;
end
```

Output :-

```
Iteration number 1
Value of x=3.09778
Value of y=12.6
Value of z=6.15714
Iteration number 2
Value of x=2.39841
Value of y=11.7334
Value of z=4.20698
Iteration number 3
Value of x=2.4533
Value of y=11.9402
Value of z=4.619
Iteration number 4
Value of x=2.44044
Value of y=11.9188
Value of z=4.58468
Iteration number 5
Value of x=2.44173
Value of y=11.9226
Value of z=4.59234
Iteration number 6
Value of x=2.4415
Value of y=11.9221
Value of z=4.59155
Iteration number 7
Value of x=2.44152
Value of y=11.9222
Value of z=4.59169
Iteration number 8
Value of x=2.44152
Value of y=11.9222
Value of z=4.59167
Iteration number 9
Value of x=2.44152
Value of y=11.9222
Value of z=4.59167
Iteration number 10
Value of x=2.44152
Value of y=11.9222
Value of z=4.59167
--> |
```

Program No. 8 :- Write a scilab code to solve the following equations in terms of x,y,z,w by using gauss jacobi method for 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 :-

```
Iteration number 1
Value of x=2.875
Value of y=3.46667
Value of z=2.86364
Value of w=5.07143
Iteration number 2
Value of x=-0.630979
Value of y=-0.0469697
Value of z=-1.25969
Value of w=3.75557
Iteration number 3
Value of x=1.23928
Value of y=2.13411
Value of z=1.77105
Value of w=5.30333
Iteration number 4
Value of x=-0.375498
Value of y=0.354266
Value of z=-0.250858
Value of w=4.37449
Iteration number 5
Value of x=0.690506
Value of y=1.5422
Value of z=1.3138
Value of w=5.1192
Iteration number 6
Value of x=-0.123714
Value of y=0.635291
Value of z=0.228929
Value of w=4.60931
Iteration number 7
Value of x=0.448012
Value of y=1.2711
Value of z=1.036
Value of w=4.99083
Iteration number 8
Value of x=0.026447
Value of y=0.801611
Value of z=0.461069
Value of w=4.71984
Iteration number 9
Value of x=0.328428
Value of y=1.1376
Value of z=0.881454
Value of w=4.91831
Iteration number 10
Value of x=0.108372
Value of y=0.89261
Value of z=0.57884
Value of w=4.77558
Iteration number 11
Value of x=0.267103
Value of y=1.06926
Value of z=0.798717
Value of w=4.87934
-->
```