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**2022300118**

**SE-Comps B/Batch C**

**29th February 2024**

# 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 10 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
-->
```