
CS 374 : COMPUTATIONAL AND NUMERICAL METHODS
SET 10

THE JACOBI ITERATION METHOD AND THE GAUSS-SEIDEL METHOD

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OCTOBER 17, 2019

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1 Initial value = [0,0,0]

1.1 Jacobi Method

itrno	x_1	x_2	x_3	error
1	0	0	0	2.4495
2	1.1111	1.9	0	1.0111
3	0.9	1.6778	-0.99394	0.33744
4	1.0351	2.0182	-0.85556	0.14976
5	0.98193	1.9496	-1.0162	0.055899
6	1.0074	2.0085	-0.97676	0.025818
7	0.99648	1.9915	-1.0051	0.010479
8	1.0015	2.0022	-0.99597	0.0048508
9	0.9993	1.9985	-1.0012	0.0020651
10	1.0003	2.0005	-0.99926	0.00094623
11	0.99986	1.9997	-1.0003	0.00041263
12	1.0001	2.0001	-0.99986	0.00018731
13	0.99997	1.9999	-1.0001	8.2669e-05
14	1	2	-0.99997	3.7292e-05
15	0.99999	2	-1	1.6561e-05
16	1	2	-0.99999	7.4426e-06
17	1	2	-1	3.3159e-06

1.2 Gauss-Seidel Method

itrno	x_1	x_2	x_3	error
1	0	0	0	2.4495
2	1.1111	1.6778	-0.91313	0.35174
3	1.0262	1.9687	-0.99575	0.041
4	1.003	1.9981	-1.0001	0.0035445
5	1.0002	2	-1.0001	0.0002315
6	1	2	-1	1.9621e-05
7	1	2	-1	2.8211e-06

2 Initial value = $[-100, -100, -100]$

2.1 Jacobi Method

itrno	x_1	x_2	x_3	error
1	-100	-100	-100	174.37
2	23.333	51.9	63.636	84.656
3	-11.726	-21.858	-25.236	36.312
4	6.3438	11.816	11.146	16.506
5	-1.4403	-2.7126	-6.0269	7.3098
6	2.0822	3.9961	1.3792	3.2888
7	0.51385	1.0698	-2.021	1.4643
8	1.2168	2.4035	-0.52916	0.65691
9	0.90285	1.8154	-1.2059	0.29309
10	1.0434	2.0812	-0.90637	0.1313
11	0.98058	1.9632	-1.0414	0.058646
12	1.0087	2.0163	-0.98133	0.026253
13	0.99612	1.9927	-1.0083	0.011733
14	1.0017	2.0033	-0.99627	0.0052499
15	0.99922	1.9985	-1.0017	0.002347
16	1.0003	2.0007	-0.99926	0.0010499
17	0.99984	1.9997	-1.0003	0.00046946
18	1.0001	2.0001	-0.99985	0.00020999
19	0.99997	1.9999	-1.0001	9.3902e-05
20	1	2	-0.99997	4.1999e-05
21	0.99999	2	-1	1.8782e-05
22	1	2	-0.99999	8.4002e-06
23	1	2	-1	3.7567e-06

2.2 Gauss-Seidel Method

itrno	x_1	x_2	x_3	error
1	-100	-100	-100	174.37
2	23.333	27.233	-16.267	36.994
3	-0.10741	6.8015	-2.444	5.1347
4	0.62694	2.5078	-1.0829	0.63554
5	0.95279	2.0343	-0.9996	0.058365
6	0.99614	2.0007	-0.99919	0.0039957
7	0.99984	1.9998	-0.99988	0.00029358
8	1	2	-0.99999	4.1299e-05
9	1	2	-1	5.0348e-06

3 Initial value = [100,100,100]

3.1 Jacobi Method

itrno	x_1	x_2	x_3	error
1	100	100	100	172.06
2	-21.111	-48.1	-63.636	83.2
3	13.526	25.213	23.248	35.829
4	-4.2735	-7.7798	-12.857	16.25
5	3.4041	6.6119	3.9945	7.2107
6	-0.067382	0.020817	-3.3327	3.2401
7	1.4791	2.9133	0.010807	1.4441
8	0.78621	1.6009	-1.4628	0.64739
9	1.0958	2.1816	-0.79658	0.28901
10	0.95722	1.9198	-1.0921	0.12942
11	1.0191	2.0362	-0.95918	0.057824
12	0.99144	1.9839	-1.0184	0.025879
13	1.0038	2.0072	-0.99182	0.011568
14	0.99829	1.9968	-1.0037	0.0051754
15	1.0008	2.0014	-0.99836	0.0023139
16	0.99966	1.9994	-1.0007	0.0010351
17	1.0002	2.0003	-0.99967	0.00046283
18	0.99993	1.9999	-1.0001	0.00020702
19	1	2.0001	-0.99993	9.2575e-05
20	0.99999	2	-1	4.1405e-05
21	1	2	-0.99999	1.8516e-05
22	1	2	-1	8.2813e-06
23	1	2	-1	3.7035e-06

3.2 Gauss-Seidel Method

itrno	x_1	x_2	x_3	error
1	100	100	100	172.06
2	-21.111	-23.878	14.44	37.376
3	2.1597	-2.8641	0.45247	5.2071
4	1.3791	1.4884	-0.91736	0.64203
5	1.0477	1.9657	-1.0005	0.058733
6	1.0039	1.9994	-1.0008	0.0040073
7	1.0002	2.0002	-1.0001	0.00029682
8	0.99999	2	-1	4.1874e-05
9	1	2	-1	5.0852e-06