

```

1  #include <iostream>
2  #include <vector>
3  #include <math.h>
4  #include <numeric>
5
6  using namespace std;
7
8  vector<float> solve(vector<vector<float>> equations, bool isGS)
9  {
10     vector<float> result(equations.size());
11     vector<float> previousResult(equations.size());
12     float error, sumResults = 0, sumPrevResults = 0;
13
14     do
15     {
16         for (int i = 0; i < result.size(); i++)
17         {
18             previousResult[i] = result[i];
19             result[i] = equations[i][equations[0].size() - 1];
20             for (int j = 0; j < result.size(); j++)
21             {
22                 if (i != j)
23                 {
24                     if (isGS)
25                         result[i] -= (result[j] * equations[i][j]);
26                     else
27                         result[i] -= (previousResult[j] * equations[i][j]);
28                 }
29             }
30             result[i] /= equations[i][i];
31         }
32
33         sumResults = accumulate(result.begin(), result.end(), 0);
34         sumPrevResults = accumulate(previousResult.begin(), previousResult.end(), 0);
35         error = abs((sumResults - sumPrevResults) / sumResults);
36     } while (error > 0.00001);
37
38     return result;
39 }
40
41 int main()
42 {
43     char variables[] = {'x', 'y', 'z', 'a', 'b', 'c', 'p', 'q', 'r'};
44
45     vector<vector<float>> equations2 =
46     {
47         {3, -0.1, -0.2, 7.85},
48         {0.1, 7, -0.3, -19.3},
49         {0.3, -0.2, 10, 71.4}};
50
51     vector<vector<float>> equations =
52     {
53         {7, 1, -2, 5},
54         {-3, -5, 1, -20},
55         {2, 2, -6, -8}};
56
57     vector<float> valuesGS = solve(equations, true);
58     vector<float> valuesJacobi = solve(equations, false);
59
60     cout << endl;
61     cout << "Gauss-Seidel:\n";
62     for (int i = 0; i < valuesGS.size(); i++)
63         cout << " " << variables[i] << " = " << valuesGS[i] << endl;
64     cout << "\nJacobi:\n";
65     for (int i = 0; i < valuesJacobi.size(); i++)
66         cout << " " << variables[i] << " = " << valuesJacobi[i] << endl;
67     cout << endl;
68 }
69

```

Gauss-Seidel:

x = 0.993197

y = 3.95646

z = 2.98322

Jacobi:

x = 0.714286

y = 3.57143

z = 2.90476