

C++ code 2.18.6: EIGEN-based implementation of GaussSeidel_iteration()

```
2 template <typename RECORDER = std::function<void(double, double)>>
3 bool GaussSeidel_iteration_II(
4     const CRSMatrix &A, const Eigen::VectorXd &b, Eigen::VectorXd &x,
5     double atol = 1.0E-8, double rtol = 1.0E-6, unsigned int maxit = 100,
6     RECORDER &&rec = [] (double, double) -> void {} ) {
7     assert(A.n == A.m && "Matrix must be square");
8     assert(A.n == b.size() && "Vector b length mismatch");
9     assert(A.n == x.size() && "Vector x length mismatch");
10
11     // Main loop for Gauss-Seidel iteration
12     Eigen::VectorXd x_old{x};
13     for (unsigned int k = 0; k < maxit; ++k) {
14         // TODO: (2-18.d; optional) Second function to implement the
15         // Gauss-Seidel
16         // iteration, not required to implement.
17         // START
18         if (!GaussSeidelstep_crs(A, b, x)) return false;
19         const double delta_x_norm = (x - x_old).norm();
20         const double x_norm = x.norm();
21         rec(x_norm, delta_x_norm); //
22         if ((delta_x_norm < atol) ||
23             (delta_x_norm < rtol * x_norm)) { //
24             return true;
25         }
26         x_old = x;
27         // END
28     }
29     // No termination
30     return false;
31 }
```

Get it on  GitLab (auxiliary_functions.hpp).