Algorithm 5: Levenberg-Marquardt algorithm

input : $f : \mathbb{R}^n \to \mathbb{R}$ a function such that $f(\mathbf{x}) = \sum_{i=1}^{m} (f_i(\mathbf{x}))^2$
where all the f_i are differentiable functions from $\mathbb{R}^n$ to $\mathbb{R}$
$\mathbf{x}^{(0)}$ an initial solution

output: $\mathbf{x}^\star$, a local minimum of the cost function f.

```
1  begin
2      k ← 0 ;
3      λ ← max diag(J^T J) ;
4      x ← x^(0) ;
5      while STOP-CRIT and (k < k_max) do
6          Find δ such that (J^T J + λ diag(J^T J))δ = J^T f ;
7          x' ← x + δ ;
8          if f(x') < f(x) then
9              x ← x' ;
10             λ ← λ/ν ;
11         else
12             λ ← νλ ;
13         k ← k + 1 ;
14     return x
15 end
```