In[1]:=
```
SOR[a0_, b0_, x0_, w0_, e0_, m0_] :=
 Module[{},
  A = a0;
  B = b0;
  X = x0;
  w = N[w0];
  e = N[e0];
  m = N[m0];
  n = Length[X];
  k = 0;
  X1 = X;
  Print["Given System is : " MatrixForm[A], "X = ", MatrixForm[B]];
  Print["with w= ", w];
  output = {{k, NumberForm[X1, 10]}};
  While[k < m,
   For[i = 1, i ≤ n, i++,
    X1[[i]] = N[(1 - w) * X[[i]] + w * (1 / A[[i, i]]) * (B[[i]] -
            Sum[A[[i, j]] * X1[[j]], {j, 1, i - 1}] - Sum[A[[i, j]] * X[[j]], {j, i + 1, n}])];
   ];
   output = Append[output, {k + 1, NumberForm[X1, 10]}];
   If[Norm[X1 - X] < e, Print["Condition Exists at ", k + 1, "."]; Break[]];
   X = X1;
   k++
  ];
  Print[NumberForm[TableForm[output, TableHeadings → {None, {"k", "X[]"}}], 16]];
  Print["X =  ", NumberForm[X1, 10]];
 ]
A = {{5, 1, 2}, {-3, 9, 4}, {1, 2, -7}};
B = {10, -14, -33};
X = {0, 0, 0};
SOR[A, B, X, 0.9, 10^(-5), 25]
```

Given System is : $\begin{pmatrix} 5 & 1 & 2 \\ -3 & 9 & 4 \\ 1 & 2 & -7 \end{pmatrix} X = \begin{pmatrix} 10 \\ -14 \\ -33 \end{pmatrix}$

with w= 0.9

Condition Exists at 8.

k	X[]
0	{0, 0, 0}
1	{1.8, -0.86, 4.253142857}
2	{0.6036685714, -3.006156571, 3.972774269}
3	{0.971276303, -2.998342474, 3.994010601}
4	{0.9989854592, -2.99774285, 3.999851029}
5	{0.9995458885, -2.99985093, 3.999965049}
6	{0.9999403385, -2.999989011, 3.99999166}
7	{0.9999950583, -2.999997048, 3.99999929}
8	{0.9999992301, -2.999999652, 3.99999992}

X = {0.9999992301, -2.999999652, 3.99999992}