Practical 5 (b) - Guass Seidel Method

```
GaussJacobi[A0_, b0_, X0_, maxiter_] :=
  Module[{A = N[A0], b = N[b0], xk = X0, xk1, i, j, k = 0, n, m, Outputdetails},
   size = Dimensions[A];
   n = size[[1]];
   m = size[[2]];
   If[n ≠ m,
    Print["Not a square matrix, cannot proceed with Gauss jacobi method"];
    Return[]];
   OutputDetails = {xk};
   xk1 = Table[0, {n}];
   While[k < maxiter,
    For[i = 1, i ≤ n, i++,
```

$$xk1[[i]] = \frac{1}{A[[i, i]]} \left(b[[i]] - \sum_{j=1}^{i-1} A[[i, j]] * xk1[[j]] - \sum_{j=i+1}^{n} A[[i, j]] * xk[[j]] \right);];$$

```
    k++;
    OutputDetails = Append[OutputDetails, xk1];
    xk = xk1;];
   colHeading = Table[X[s], {s, 1, n}];
   Print[NumberForm[TableForm[OutputDetails,
       TableHeadings → {None, colHeading}], 6]];
   Print["No. of iterations performed", maxiter];];
A = {{2, -1, 0}, {-1, 2, -1}, {0, -1, 2}};
b = {7, 1, 1};
X0 = {0, 0, 0};
GaussJacobi[A, b, X0, 15]
```

X[1]	X[2]	X[3]
0	0	0
3.5	2.25	1.625
4.625	3.625	2.3125
5.3125	4.3125	2.65625
5.65625	4.65625	2.82813
5.82813	4.82813	2.91406
5.91406	4.91406	2.95703
5.95703	4.95703	2.97852
5.97852	4.97852	2.98926
5.98926	4.98926	2.99463
5.99463	4.99463	2.99731
5.99731	4.99731	2.99866
5.99866	4.99866	2.99933
5.99933	4.99933	2.99966
5.99966	4.99966	2.99983
5.99983	4.99983	2.99992

No. of iterations performed15