In[ ]:=
```
GaussJacobi[A0_, b0_, x0_, maxiter_] :=
  Module[{A = N[A0], b = N[b0], xk = X0, xk1, i, j, k = 0, n, m, Output},
   size = Dimensions[A];
   n = size[[1]];
   m = size[[2]];
   If[n ≠ m, Print["Not a square matrix, cannot proceed with Gauss Jacobi Method"];
    Return[]];
   Output = {xk};
   xk1 = Table[0, {n}];
   While[k < maxiter, For[i = 1, i ≤ n, i++,
     xk1[[i]] = (1 / A[[i, i]]) * (b[[i]] -
          Sum[A[[i, j]] * xk[[j]], {j, i - 1}] - Sum[A[[i, j]] * xk[[j]], {j, i + 1, n}]);];
    k++;
    Output = Append[Output, xk1]; xk = xk1;];
   colHeading = Table[X[i], {i, 1, n}];
   Print[NumberForm[TableForm[Output, TableHeadings → {None, colHeading}], 6]];
   Print["Number of iterations performed ", maxiter];];
```

Question 1

```
A = {{5, 1, 2}, {-3, 9, 4}, {1, 2, -7}};
b = {10, -14, -33};
X0 = {0, 0, 0};
GaussJacobi[A, b, x0, 15]
```

X[1]	X[2]	X[3]
0	0	0
2.	-1.55556	4.71429
0.425397	-2.98413	4.55556
0.774603	-3.43845	3.92245
1.11871	-3.04067	3.84253
1.07112	-2.89044	4.00534
0.975953	-2.97867	4.04146
0.979148	-3.02644	4.00266
1.00422	-3.00813	3.98947
1.00584	-2.99391	3.99828
0.99947	-2.99729	4.00257
0.998428	-3.00132	4.0007
0.999985	-3.00083	3.9994
1.00041	-2.99974	3.99976
1.00004	-2.99976	4.00013
0.999898	-3.00004	4.00008

```
Number of iterations performed 15
```

In[ ]:=

Question 2

```
A = {{4, 1, 1}, {1, 5, 2}, {1, 2, 3}};
b = {2, -6, -4};
X0 = {0.5, -0.5, -0.5};
GaussJacobi[A, b, x0, 10]
```

X[1]	X[2]	X[3]
0.5	−0.5	−0.5
0.75	−1.1	−1.16667
1.06667	−0.883333	−0.85
0.933333	−1.07333	−1.1
1.04333	−0.946667	−0.928889
0.968889	−1.03711	−1.05
1.02178	−0.973778	−0.964889
0.984667	−1.0184	−1.02474
1.01079	−0.987037	−0.982622
0.992415	−1.00911	−1.01224
1.00534	−0.993588	−0.9914

Number of iterations performed 10

Question 3

In[ ]:=
```
A = {{2, -1, 0}, {-1, 2, -1}, {0, -1, 2}};
b = {7, 1, 1};
X0 = {0, 0, 0};
GaussJacobi[A, b, x0, 12]
```

X[1]	X[2]	X[3]
0	0	0
3.5	0.5	0.5
3.75	2.5	0.75
4.75	2.75	1.75
4.875	3.75	1.875
5.375	3.875	2.375
5.4375	4.375	2.4375
5.6875	4.4375	2.6875
5.71875	4.6875	2.71875
5.84375	4.71875	2.84375
5.85938	4.84375	2.85938
5.92188	4.85938	2.92188
5.92969	4.92188	2.92969

Number of iterations performed 12