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| Course Number | ESE 1444 |
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| Course Title | MATHEMATICS FOR EMBEDDED SYSTEMS |
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**LAB:2 (Part 1)**

SUBMITTED BY

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**Question: -** C++ program to Solution of Linear Equations using Gauss Elimination method.

* Program: -

#include <iostream>

#include <cmath>

#include <vector>

using namespace std;

void print(vector< vector<double> > A) {

int n = A.size();

for (int i=0; i<n; i++) {

for (int j=0; j<n+1; j++) {

cout << A[i][j] << "\t";

if (j == n-1) {

cout << "| ";

}

}

cout << "\n";

}

cout << endl;

}

vector<double> gauss(vector< vector<double> > A) {

int n = A.size();

for (int i=0; i<n; i++) {

// Search for maximum in this column

double maxEl = abs(A[i][i]);

int maxRow = i;

for (int k=i+1; k<n; k++) {

if (abs(A[k][i]) > maxEl) {

maxEl = abs(A[k][i]);

maxRow = k;

}

}

// Swap maximum row with current row (column by column)

for (int k=i; k<n+1;k++) {

double tmp = A[maxRow][k];

A[maxRow][k] = A[i][k];

A[i][k] = tmp;

}

// Make all rows below this one 0 in current column

for (int k=i+1; k<n; k++) {

double c = -A[k][i]/A[i][i];

for (int j=i; j<n+1; j++) {

if (i==j) {

A[k][j] = 0;

} else {

A[k][j] += c \* A[i][j];

}

}

}

}

// Solve equation Ax=b for an upper triangular matrix A

vector<double> x(n);

for (int i=n-1; i>=0; i--) {

x[i] = A[i][n]/A[i][i];

for (int k=i-1;k>=0; k--) {

A[k][n] -= A[k][i] \* x[i];

}

}

return x;

}

int main() {

int n;

cout<<"Enter the size of matrix: - ";

cin >> n;

vector<double> line(n+1,0);

vector< vector<double> > A(n,line);

cout<<"Enter the matrix:-"<<endl;

// Read input data

for (int i=0; i<n; i++) {

for (int j=0; j<n; j++) {

cin >> A[i][j];

}

}

for (int i=0; i<n; i++) {

cin >> A[i][n];

}

// Print input

print(A);

// Calculate solution

vector<double> x(n);

x = gauss(A);

// Print result

cout << "Result:\t";

for (int i=0; i<n; i++) {

cout << x[i] << " ";

}

cout << endl;

}

* **Program output:-**

