Lab report on

Gauss elimination and Gauss-Jordan Elimination

Submitted by
Md Shafiqul Islam
1905028, 2019-20
2nd Year, 2nd Semester
Computer Science And Engineering
Begum Rokeya University, Rangpur

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Code for gauss elimination -

```cpp
#include <iostream>
#include <cmath>
using namespace std;

const double eps = 1e-9;

int main() {
    int n;
    cout << "Enter the number of variables: ";
    cin >> n;

    double a[n][n+1]; // augmented matrix of the system
    cout << "Enter the coefficients of the system:\n";
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n+1; j++) {
            cin >> a[i][j];
        }
    }

    // perform Gauss elimination
    for (int i = 0; i < n; i++) {
        // find pivot row
        int pivot = i;
        for (int j = i+1; j < n; j++) {
            if (fabs(a[j][i]) > fabs(a[pivot][i])) {
                pivot = j;
            }
        }
        if (fabs(a[pivot][i]) < eps) {
            cout << "No unique solution exists.\n";
            return 0;
        }
        if (pivot != i) {
            swap(a[i], a[pivot]); // swap rows i and pivot
        }
        // eliminate variables
        for (int j = i+1; j < n; j++) {
            double ratio = a[j][i] / a[i][i];
            for (int k = i; k < n+1; k++) {
                a[j][k] -= ratio * a[i][k];
            }
        }
    }

    // check for inconsistency
    if (fabs(a[n-1][n-1]) < eps && fabs(a[n-1][n]) > eps)
{       cout << "No solution exists.\n";
        return 0;
    }

    // back-substitute to find solution
    double x[n];
    for (int i = n-1; i >= 0; i--) {
        double sum = 0;
        for (int j = i+1; j < n; j++) {
            sum += a[i][j] * x[j];
        }
        x[i] = (a[i][n] - sum) / a[i][i];
    }

    // print solution
    cout << "The solution is:\n";
    for (int i = 0; i < n; i++) {
        cout << "x" << i+1 << " = " << x[i] << endl;
    }

    return 0;
}
```

Output in the terminal -

```
~/
Enter the number of variables: 3
Enter the coefficients of the system:
2 1 -1 8
-3 -1 2 -11
-2 1 2 -3
The solution is:
x1 = 2
x2 = 3
x3 = -1
```