Assignment – 3

1) Solving Ax=b :-

We solved this using **Gauss Elimination** method. The algorithm for Gauss Elimination is as follows.

```
Function GaussElimination(A)
    for(i=1 to n) do
        max = |A(i,j)|
        max_row = i
        for(k=i+1 to n) do
            if |A(k,i)| > max then
                max = A(k,i)
                max_row = k
            end if
        end for
        swap(A(max_row),A(i))            // swap column wise
        for(k=i+1 to n) do
            c = A(k,i)/A(i,i)
            for(j=i to n) do
                if (i==j) then
                    A(k,j) = 0
                else
                    A(k,j) += c.A(i,j)
                end if
            end for
        end for
    end for

    // Solve for x
    for(i=n to 1) do
        x(i) = A(i,n+1)/A(i,i)
        for(k=i-1 to 1) do
            A(k,n+1) -= A(k,i).x(i)
        end for
    end for

    return x
end Function
```

2) Given L and the sets R, P , Q and Γ , from the routines of Problem Set 1, we directly used the functions **PARTITION-ALL, BUILD-MATRIX** to find all possible *l's* and calculate the matrix A^TA. Then we calculate the vector $F^{\gamma}{}_1$. Now that we have A^TA and $A^TF^{\Gamma}{}_1$ and then call the above Solve-LS routine to obtain the solution of the equation,

$$(A^TA)X = A^TF^{\Gamma}{}_1$$