Gauss Elimination Algorithm Class

1st. *General Steps of Gauss Elimination from the Book:*

Steps	The Condition
Step 1	For i=1,……n-1 do step 2-4
Step 2	Let p be smallest integer number while $i \le p \le n$ and $a_{pi} 0$ If no integer p can be found Then OUTPUT ('no unique solution exists')
Step 3	If $p \neq i$ then perform $\leftrightarrow E_i$
Step 4	For j=i+1 , … , n do step 5 to 6
Step 5	Set $m_{ji=}$
Step 6	perform $(E_j - m E_i) \rightarrow E_j$
Step 7	If $a_{nn} =0$ then OUTPUT ('no unique solution ') STOP
Step 8	Set x_n = /
Step 9	For i=n-1,…..1 set $x_i = [a_{i,n+1} - \sum^{n}_{j=i+1} a_{ij,}]/ a_{ii}$
Step 10	OUTPUT (x_1 ….., x_n) *procedure completed successfully* STOP

Read this steps before copy the program from the note.

Steps as following :-

```
% Gauss Elimination Used for Numerical Method
% note make sure the all line in his position because the sequences of
% order in the operation
clc
clear
% the following step is to enter the size of the equation or number of
% unknowns
fprintf(1,'input the number of equation - an integer .\n');
n= input(' ');
% The next steps is for clean the matrix
a=zeros(n,n+1);
x=zeros(1,n);
% you have to enter the value as matrix as [1,1,,...(1)] and make sure that
% the last number is present the right side of the equation
for i=1:n
   a(i,1:n+1) = input('Enter the matrix row by row \n')
end;
m=n+1

% the first three step is arranging only
% step 1
for i=1:n-1,

% step 2
   flag=0;
   for p=i:n,
      if a(p,i) ~=0,
         flag=1;
         break;
      end;
   end;

   if flag==0, error ('No unique solution '); end;

  % step 3 to check
  if p~=i,

     for k=1:m,
        tmp=a(i,k);
        a(i,k)=a(p,k);
        a(p,k)=tmp;
     end;
  end;


  % Step 4 from here the Gauss method start
  for j=i+1:n
     % step 5
```

```
      mji=a(j,i)/a(i,i)
      % step 6
      for k=1:m
         a(j,k)=a(j,k)-mji*a(i,k);
      end;
  end;
end;

% setp 7
if a(n,n)==0 error('no unique solution '); end;

% step 8 to 9 are for calculate the root

% step 8
x(n)=a(n,n+1)/a(n,n);
% Step 9
for i=n-1:-1:1,
   s=0;
   for j=i+1:n,
      s=s+a(i,j)*x(j);
   end;
   x(i)=(a(i,n+1)-s)/a(i,i);
end;

% Step 10
for i=1:n
   fprintf(1,'x(   %d',i);
   fprintf(1,')=  %d',x(i));
   fprintf('\n');
end;
```

The value that Entered to the MATLAB are as following: ---

```
Enter the matrix row by row
[2,3,5]

a =

    2    3    5
    0    0    0

Enter the matrix row by row
[1,4,9]

a =

    2    3    5
    1    4    9
```

```
m =

     3


mji =

    0.5000

x(   1)=  -1.400000e+000
x(   2)=  2.600000e+000
>>
```

Duty for next class

The assignment for lecture is to make the GAUSS JORDAN ALGORITHM before come to class as the GAUSS method