HW-1 (Not contributing to final mark)

Attempt to implement the following Pseudocode in Matlab. Practice to solve the example questions in Matlab.

```
SUB Gauss(a, b, n, x, tol, er)
  DIMENSION s(n)
  er = 0
  DOFOR i = 1, n
   s_i = ABS(a_i,1)
   DOFOR j = 2, n
     IF ABS(a_i,j)>s_i THEN s_i = ABS(a_i,j)
   END DO
  END DO
 CALL Eliminate(a, s, n, b, tol, er)
  IF er ≠ -1 THEN
   CALL Substitute(a, n, b, x)
  END IF
END Gauss

SUB Eliminate(a, s, n, b, tol, er)
  DOFOR k = 1, n - 1
   CALL Pivot (a, b, s, n, k)
   IF ABS (a_k,k/s_k) < tol THEN
     er = -1
     EXIT DO
   END IF
   DOFOR i = k + 1, n
     factor = a_i,k/a_k,k
     DOFOR j = k + 1, n
       a_i,j = a_i,j - factor*a_k,j
     END DO
     b_i = b_i - factor * b_k
   END DO
  END DO
  IF ABS(a_n,n/s_n) < tol THEN er = -1
END Eliminate
```

```
SUB Ludecomp(a, b, n, tol, x, er)
  DIM o_n, s_n
  er = 0
  CALL Decompose(a, n, tol, o, s, er)
  IF er <> -1 THEN
   CALL Substitute(a, o, n, b, x)
  END IF
END Ludecomp

SUB Decompose (a, n, tol, o, s, er)
  DOFOR i = 1, n
   o_i = i
   s_i = ABS(a_i,1)
   DOFOR j = 2, n
     IF ABS(a_i,j)>s_i THEN s_i = ABS(a_i,j)
   END DO
  END DO
  DOFOR k = 1, n - 1
   CALL Pivot(a, o, s, n, k)
   IF ABS(a_o(k),k/s_o(k)) < tol THEN
       er = -1
       PRINT a_o(k),k/s_o(k)
       EXIT DO
   END IF
   DOFOR i = k + 1, n
       factor = a_o(i),k/a_o(k),k
       a_o(i),k = factor
       DOFOR j = k + 1, n
       a_o(i),j = a_o(i),j - factor * a_o(k),j
       END DO
   END DO
  END DO
  IF ABS(a_o(k),k/s_o(k)) < tol THEN
     er = -1
     PRINT a_o(k),k/s_o(k)
  END IF
END Decompose
```

```
SUB Pivot(a, b, s, n, k)
  p = k
  big = ABS(a_{k,k}/s_k)
  DOFOR ii = k + 1, n
   dummy = ABS(a_{ii,k}/s_{ii})
   IF dummy > big THEN
     big = dummy
     p = ii
   END IF
  END DO
  IF p ≠ k THEN
   DOFOR jj = k, n
     dummy = a_{p,jj}
     a_{p,jj} = a_{k,jj}
     a_{k,jj} = dummy
   END DO
   dummy = b_p
   b_p = b_k
   b_k = dummy
   dummy = s_p
   s_p = s_k
   s_k = dummy
  END IF
END pivot

SUB Substitute(a, n, b, x)
  x_n = b_n/a_{n,n}
  DOFOR i = n - 1, 1, -1
   sum = 0
   DOFOR j = i + 1, n
     sum = sum + a_{i,j} * x_j
   END DO
   x_n = (b_n - sum) / a_{n,n}
  END DO
END Substitute
```