Eric Slud, Sec. 0501 Friday, 9/6/02

MATLAB Log 1, Math 461

```
>> A = [ 2 7 3 0 ; -1 1 2 4; 3 4 6 -2 ]
A =
     2     7     3     0
    -1     1     2     4
     3     4     6    -2

>> A(1,:)
ans =
     2     7     3     0

>> A(2,: ) = A(2,:) + 0.5*A(1, :) ;

>> A(3,:) = A(3,:) + (-1.5)*A(1,:)
...
    2.0000    7.0000    3.0000         0
         0    4.5000    3.5000    4.0000
         0   -6.5000    1.5000   -2.0000

>> A(3,:) = A(3,:) + (6.5/4.5)*A(2,:) ;
>> A(1,:) = A(1,:)/A(1,1) ; A(2,:) = A(2,:)/A(2,2)
>> A(3,:) = A(3,:)/A(3,3)
```

```
A =

    1.0000    3.5000    1.5000         0
         0    1.0000    0.7778    0.8889
         0         0    1.0000    0.5763

>> A(1,:) = A(1,:) - A(2,:)*3.5 ;

A =

    1.0000         0   -1.2222   -3.1111
         0    1.0000    0.7778    0.8889
         0         0    1.0000    0.5763

>> A(1,:) = A(1,:) + (11/9)*A(3,:) ;

>> A(2,:) = A(2,:) - (7/9)*A(3,:)

A =
    1.0000         0         0   -2.4068
         0    1.0000         0    0.4407
         0         0    1.0000    0.5763
```

Previous example shows **elementary row-operations** to reduce first to **row echelon form**, then to **reduced row echelon form** resulting in *unique solution*.

MORE GENERALLY: row-echelon form might have final appearance ($*$ means **nonzero** value)

$$\begin{pmatrix} * & a_{12} & a_{13} & \cdots & a_{1k} & b_1 \\ 0 & * & a_{23} & \cdots & a_{2k} & b_2 \\ \cdots \\ 0 & 0 & 0 & 0 & 0 & * \end{pmatrix}$$

showing **Inconsistency** (NO SOLUTION), or

$$\begin{pmatrix} * & a_{12} & a_{13} & \cdots & a_{1,n} & \cdots & b_1 \\ 0 & * & a_{23} & \cdots & a_{2,n} & \cdots & b_2 \\ \cdots \\ 0 & 0 & 0 & \cdots & * & * & b_n \end{pmatrix}$$

with number of **pivot positions** less than number of variables *with at least some nonzero coeffiients for the extra variables in the final row indicating* (INFINITELY MANY SOLUTIONS)