## 4.3. Gaus-Jordan Elimination. Tuesday, October 3, 2017 8:36 AM

Goals: 1) Reduced Row-Echelon form of a

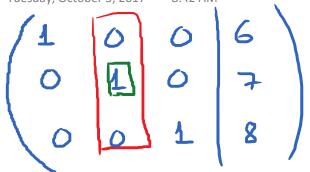
2) Gauss-Jordan Elimination.

E.g. x + 2y - 3 = 5 2x - 3y + 3 = 33x - y - 23 = 7

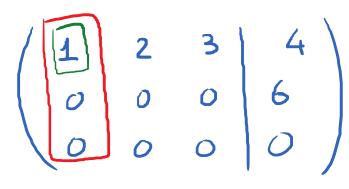
Augmented matrix?

$$\begin{pmatrix} 1 & 2 & -1 & 5 \\ 2 & -3 & 1 & 3 \\ 3 & -1 & -2 & 7 \end{pmatrix}$$

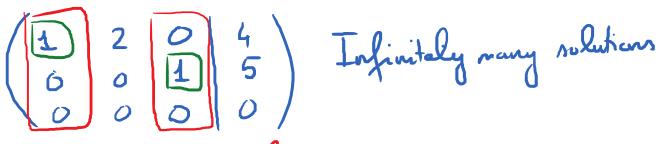
Some possible "nice" form of a 3-by-3 matrix that will tell us what the solution(s) to system look like.



$$x = 6$$
  
 $y = 7$   
 $3 = 8$ 



No Solution



Kedned Row Echelon form.

A matrix is in Reduced Rou echelon form if:

- (1) Each row consisting entirely of zeros must be below any row having a nonzero entry
- 2) The left most nonzero element in each row must

3) All other elements in the column that contains the left most 1 of a given now must be zero. (4) The left most 1 in any row is to the right of the left most 1 in the row above it. 1 0 0 3 0 0 1 5 0 1 0 4 Not in -> Rz = R3. reduced row echelon form

E.g. Use Gauss-Jordan elimination to turn the given matrix into reduced row-enhelon form.

Tuesday, October 3, 2017 9:06 AM
$$\begin{pmatrix}
1 & 1 & -1 & -2 \\
2 & -1 & 1 & 5 \\
-1 & 2 & 2 & 1
\end{pmatrix}
\xrightarrow{R_2 \leftarrow -2R_1 + R_2}$$

$$\begin{pmatrix} 1 & 1 & -1 & | & -2 \\ 0 & -3 & 3 & | & 9 \\ -1 & 2 & 2 & | & 1 \end{pmatrix} \xrightarrow{R_3 \leftrightarrow R_1 + R_3} \begin{pmatrix} 1 & 1 & -1 & | & -2 \\ 0 & -3 & 3 & | & 9 \\ 0 & 3 & 1 & | & -1 \end{pmatrix}$$

$$\frac{1}{R_{2} \leftrightarrow R_{3} + R_{2}} \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{pmatrix} \qquad \begin{array}{c} x = 1 \\ y = -1 \\ 3 = 2 \end{array}$$