

$R_2 \rightarrow \frac{1}{4}R_2$

	1st	2nd	3rd	...
1st	1	2	3	
2nd	4	5	6	
3rd	0	.	0	
4th	0	.	0	
5th	.			
6th	.			
7th	.			
8th	0			
9th	.			

is a matrix

RREF:  $\xrightarrow{R_2 \rightarrow \frac{1}{4}R_2}$ 
 $\begin{bmatrix} 1 & 2 & 3 \\ 1 & \frac{5}{4} & \frac{6}{4} \end{bmatrix}$ 
 $\xrightarrow{R_2 \rightarrow R_2 - R_1}$ 
 $\begin{bmatrix} 1 & 2 & 3 \\ 0 & -\frac{3}{4} & -\frac{6}{4} \end{bmatrix}$

① "leading 1". The first non-zero entry of each row is 1.

$\xrightarrow{R_2 \rightarrow -\frac{4}{3}R_2}$ 
 $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix}$

② "zero-out" once "leading 1" obtained, then look at the column where the "leading 1" is.

RREF requires <sup>that</sup> all other elements except the leading 1 in that column are zeros

③ "stair-shape" All <sup>the</sup> leading ones form a stair-shape toward down to the right.

$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix}$



A typical non-example looks like

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

which satisfies ① ②, but not ③

$$\underline{R_2 \leftrightarrow R_3} \quad \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

④ zero-rows are placed at the bottom.  
(A row with all zero entries)

$$\begin{bmatrix} 1 & 2 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \xrightarrow{R_2 \leftrightarrow R_3} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

Not RREF