

E.g. Find the values for  $h$  so that the system

$$\begin{cases} 3x_1 + 6x_3 = 3 \\ x_2 + \cancel{h} \cdot x_3 = 0 \\ 2x_1 - 3x_2 + 5x_3 = 3 \end{cases}$$

is consistent.

$$\left[ \begin{array}{ccc|c} 3 & 0 & 6 & 3 \\ 0 & 1 & h & 0 \\ 2 & -3 & 5 & 3 \end{array} \right]$$

$$\sim \left[ \begin{array}{ccc|c} \textcircled{1} & 0 & 2 & 1 \\ 0 & 1 & h & 0 \\ 2 & -3 & 5 & 3 \end{array} \right] \xrightarrow{\frac{1}{3} \cdot r_1} \sim \left[ \begin{array}{ccc|c} \textcircled{1} & 0 & 2 & 1 \\ 0 & 1 & h & 0 \\ 0 & -3 & 1 & 1 \end{array} \right] \xrightarrow{r_3 - 2 \cdot r_1}$$

$$\left[ \begin{array}{ccc|c} 1 & 0 & 2 & 1 \\ 0 & 1 & h & 0 \\ 0 & -3 & 1 & 1 \end{array} \right]$$

$$\sim \left[ \begin{array}{ccc|c} 1 & 0 & 2 & 1 \\ 0 & 1 & h & 0 \\ 0 & 0 & 1+3h & 1 \end{array} \right] \quad \leftarrow \text{echelon form}$$

$r_3 + 3 \cdot r_2$

Remember: want  $h$  making this system consistent

Remember system is consistent  $\Leftrightarrow \left[ \begin{array}{ccc|c} 0 & 0 & 0 & 1 \end{array} \right]$   
 does NOT appear  
 in reduced echelon form.

$$\Leftrightarrow 1+3h \neq 0$$

$$\Leftrightarrow h \neq -\frac{1}{3}$$