

What are some singular cases with 3 x 3 matrices?

Do now: Find the solution

$$x - 2y + z = 1 \rightarrow 2x - 4y + 2z = 2$$

$$3x + 2y - z = 2$$

$$2x - 4y + 2z = 5$$

singular.

Find the solution

$$3x - 2y + 3z = 1$$

$$\rightarrow 3x - 2y = 1$$

$$x + 2y + 9z = 2$$

$$x + 2y = 2$$

$$6x - 2y + 12z = 3$$

$$\begin{aligned} 4x &= 3 \\ x &= \frac{3}{4} \\ y &= \frac{5}{8} \\ z &= 0 \end{aligned}$$

if  $z=0$ ,

singular case

$$a \begin{bmatrix} 3 \\ 1 \\ 6 \end{bmatrix} + b \begin{bmatrix} -2 \\ 2 \\ -2 \end{bmatrix} = \begin{bmatrix} 3 \\ 9 \\ 12 \end{bmatrix}$$

$$3a - 2b = 3$$

$$a + 2b = 9$$

$$6a - 2b = 12$$

$$4a = 12 \quad a = 3$$

$$3(3) - 2b = 3$$

$$2b = 6 \\ b = 3$$

✓

$$\begin{array}{l} a_1x + b_1y + c_1z \neq 0 \\ a_2x + b_2y + c_2z = 0 \\ a_3x + b_3y + c_3z = 0 \end{array}$$

**Find the solution**

$$x + y + z = 1$$

$$2x + 3z = 5$$

$$3x + y + 4z = 3$$

$$\frac{3}{2} \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + b \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix}$$