

$$\underline{X} \quad \langle x, y, z \rangle = \langle 1, 0, 1 \rangle + t \langle 2, 2, -1 \rangle$$

$$\langle x, y, z \rangle = \langle 1, 0, 0 \rangle + s \langle 1, 1, 0 \rangle$$

\Rightarrow

$$t = 1, \quad s = 2$$

Intersection $\langle 1, 0, 0 \rangle + 2 \langle 1, 1, 0 \rangle = \langle 3, 2, 0 \rangle$

$$\Rightarrow \langle 1, 0, 1 \rangle - \langle 1, 0, 0 \rangle = s \langle 1, 1, 0 \rangle - t \langle 2, 2, -1 \rangle$$

$$\begin{aligned} 0 &= s - 2t \\ 0 &= s - 2t \\ 1 &= t \end{aligned}$$

EX

$$\langle x, y, z \rangle = \langle 0, 1, 1 \rangle + t \langle 1, 0, 0 \rangle$$

$$\langle x, y, z \rangle = \langle 1, 1, 1 \rangle + s \langle 2, 0, 0 \rangle$$

$$\Rightarrow \langle 0, 1, 1 \rangle - \langle 1, 1, 1 \rangle = s \langle 2, 0, 0 \rangle - t \langle 1, 0, 0 \rangle$$

$$\begin{aligned} -1 &= 2s - t \\ 0 &= 0 \\ 0 &= 0 \end{aligned}$$

\Rightarrow no - my solutions with $t = 2s + 1$

\downarrow
Lines coincide

EX

$$\langle x, y, z \rangle = \langle 6, 0, 5 \rangle + t \langle 0, 3, -1 \rangle$$

$$\langle x, y, z \rangle = \langle 2, 9, -1 \rangle + s \langle 2, 0, 1 \rangle$$

$$\Rightarrow \langle 6, 0, 5 \rangle - \langle 2, 9, -1 \rangle =$$

$$\begin{aligned} 4 &= 2s \\ -9 &= -3t \\ 6 &= s + t \end{aligned}$$

$$\Rightarrow \begin{aligned} s &= 2 \\ t &= 3 \end{aligned}$$

But $6 = 2 + 3 = s + t$ \checkmark

\Rightarrow no intersection, lines are skew.