

Ex 4.1
#4b

Find the point of intersection of the lines
 $y = 2x + 1$ and $x - 4y + 1 = 0$.

✓ We will apply Thm 4.1.3 again. We first represent
the lines by $[2 \ -1 \ 1]$ and $[1 \ -4 \ 1]$ respectively.

Now we consider the matrix equation

$$\begin{bmatrix} 2 & -1 & 1 \\ 1 & -4 & 1 \\ a & b & c \end{bmatrix} = 0 \quad \checkmark$$

We expand and simplify.

$$a \begin{vmatrix} -1 & 1 \\ -4 & 1 \end{vmatrix} - b \begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix} + c \begin{vmatrix} 2 & -1 \\ 1 & -4 \end{vmatrix} = 0$$

$$3a - 1b - 7c = 0 \quad \text{or} \quad [a \ b \ c] \begin{bmatrix} 3 \\ -1 \\ -7 \end{bmatrix} \checkmark$$

$\begin{bmatrix} 3 \\ -1 \\ -7 \end{bmatrix}$ is not in \mathbb{F}^2 ; so we divide each entry by -7

and obtain $\begin{bmatrix} -3/7 \\ 1/7 \\ 1 \end{bmatrix}$ as our point of intersection. ✓