

$$1) A = \begin{pmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 5 & 0 \\ 4 & 0 & 1 & 8 \end{pmatrix} \xrightarrow{\cdot(-4)} \begin{pmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 5 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \xrightarrow{\cdot(1/5)} \begin{pmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \quad \text{Matice je singularární.}$$

$$(4, 0, 1, 8) = a \cdot (1, 0, 0, 2) + b \cdot (0, 1, 0, -1) + c \cdot (0, 0, 5, 0)$$

$$4 = a$$

$$0 = b$$

$$1 = 5c$$

$$8 = 2a - b$$

$$a = 4$$

$$b = 0$$

$$c = \frac{1}{5}$$

$$\vec{u}_4 = 4 \cdot \vec{u}_1 + \frac{1}{5} \cdot \vec{u}_3$$

$$2) B = \begin{pmatrix} 1 & 2 \\ 5 & 9 \end{pmatrix}$$

$$B^{-1} = \begin{pmatrix} -9 & 2 \\ 5 & -1 \end{pmatrix}$$

$$\xrightarrow{+(-5)} \begin{pmatrix} 1 & 2 & | & 1 & 0 \\ 5 & 9 & | & 0 & 1 \end{pmatrix}$$

$$\xrightarrow{+(-2)} \begin{pmatrix} 1 & 2 & | & 1 & 0 \\ 0 & -1 & | & -5 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & | & -9 & 2 \\ 0 & -1 & | & -5 & 1 \end{pmatrix} \cdot (-1)$$

$$\begin{pmatrix} 1 & 0 & | & -9 & 2 \\ 0 & 1 & | & 5 & -1 \end{pmatrix}$$

$$3) \begin{cases} p_1: x + 2y + z = 4 \\ p_2: 2x + 5y - z = 5 \\ p_3: x + 3y - z = 1 \end{cases}$$

$$\xrightarrow{(-1)} \begin{pmatrix} 1 & 2 & 1 & | & 4 \\ 2 & 5 & -1 & | & 5 \\ 1 & 3 & -2 & | & 1 \end{pmatrix} \xrightarrow{\cdot(-1)} \begin{pmatrix} 1 & 2 & 1 & | & 4 \\ 0 & 1 & -3 & | & -3 \\ 0 & 1 & -3 & | & -3 \end{pmatrix} \xrightarrow{\cdot(-1)} \begin{pmatrix} 1 & 2 & 1 & | & 4 \\ 0 & 1 & -3 & | & -3 \\ 0 & 0 & 0 & | & 0 \end{pmatrix}$$

$$\begin{cases} x = -7t + 10 \\ y = 3t - 3 \\ z = t \end{cases}$$

$$x + 2(3t - 3) + t = 4$$

$$x + 6t - 6 + t = 4$$

$$x = 10 - 7t$$

Všechny tři roviny se protínají v jedné přímce p .