

$$1.3.5$$

$$1/ \begin{pmatrix} 1 & 2 \\ 0 & -1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} 3 & 1 & 0 \\ -1 & 1 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 3 & 4 \\ 1 & -1 & -2 \\ 2 & 2 & 2 \end{pmatrix}$$

B.C. = ~~X~~

$$\begin{pmatrix} 1 & -1 & 4 \\ 2 & 0 & 1 \\ 1 & 2 & 0 \end{pmatrix} \times \begin{pmatrix} 3 & 1 & 0 \\ -1 & 1 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 3 & 1 & 0 \\ -1 & 1 & 2 \end{pmatrix} \times \begin{pmatrix} 1 & -1 & 4 \\ 2 & 0 & 1 \\ 1 & 2 & 0 \end{pmatrix} = \begin{pmatrix} 5 & -3 & 13 \\ 3 & 5 & -3 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -1 & 4 \\ 2 & 0 & 1 \\ 1 & 2 & 0 \end{pmatrix} \cdot \begin{pmatrix} a & 0 & -1 & a \\ 0 & 2a & 3 & 0 \\ 1-a & 1 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 1 & -1 & 4 \\ 2 & 0 & 1 \\ 1 & 2 & 0 \end{pmatrix}$$

$\frac{3}{3} \quad \frac{3}{4} \quad \frac{3}{4}$

2/3

$$\begin{pmatrix} a+4 & -2a-4a & -1-3+4 & a+4 \\ 2a+1 & -a & -2+1 & 2a+1 \\ a & 4a & -1+3 & a \end{pmatrix}$$

N.

1. 3. 5) (2)

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

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

$$C = \begin{pmatrix} 5 & 4 \\ 11 & 10 \end{pmatrix}$$

$$(A \cdot B)^T = \begin{pmatrix} 5 & 11 \\ 4 & 10 \end{pmatrix}$$

$$B^T = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$$

$$A^T = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$$

$$B^T \cdot A^T = \begin{pmatrix} 5 & 11 \\ 4 & 10 \end{pmatrix}$$

1.1.4 5/b

$$\left( \begin{array}{ccc|c} 1 & 1 & 2 & -1 \\ 2 & -1 & 2 & -4 \\ 4 & 1 & 4 & -2 \end{array} \right) \sim \left( \begin{array}{ccc|c} 1 & 1 & 2 & -1 \\ 0 & -3 & -2 & -2 \\ 0 & -3 & -4 & 2 \end{array} \right) \sim \left( \begin{array}{ccc|c} 1 & 1 & 2 & -1 \\ 0 & -3 & -2 & -2 \\ 0 & 0 & -2 & 4 \end{array} \right)$$

$$\begin{array}{l} a_2 - 2a_1 \\ a_3 - 4a_1 \end{array}$$

$$a_3 - a_2$$

$$\begin{array}{r} -2z = 4 \\ z = -2 \end{array} \quad \begin{array}{r} -3y + 4 = -2 \\ -3y = -6 \\ y = 2 \end{array}$$

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$$x + 2 - 4 = -1$$
$$x = 1$$

$$\begin{aligned}
 4) \quad & 2x + y - 4z = 0 \\
 & 3x + 5y - 7z = 0 \\
 & 4x - 5y - 6z = 0 \\
 & 7x + 0 - 13z = 0
 \end{aligned}$$

$$\left( \begin{array}{ccc|c}
 2 & 1 & -4 & 0 \\
 3 & 5 & -7 & 0 \\
 4 & -5 & -6 & 0 \\
 7 & 0 & -13 & 0
 \end{array} \right) \xrightarrow{\substack{(-3) \cdot (-7) \\ 2(2)}} \left( \begin{array}{ccc|c}
 2 & 1 & -4 & 0 \\
 0 & 7 & -2 & 0 \\
 0 & -7 & 2 & 0 \\
 0 & -7 & 2 & 0
 \end{array} \right) \sim \left( \begin{array}{ccc|c}
 2 & 1 & -4 & 0 \\
 0 & 7 & -2 & 0 \\
 0 & 0 & 0 & 0 \\
 0 & 0 & 0 & 0
 \end{array} \right)$$

 $\sim$ 

$$\underline{r=1}$$

$$\begin{aligned}
 \rho(A) &= 2 \\
 \rho(B) &= 2
 \end{aligned}$$

$$2x + y - 4z = 0 \quad 7y - 2z = 0$$

$$2x + \frac{2z}{7} - 4z = 0 \quad | \cdot 7 \quad 7y = 2z$$

$$14x + 2z - 28z = 0$$

$$14x = 26z$$

$$x = \frac{26}{14} z = \frac{13}{7} z$$

$$K = \left\{ \left( \frac{13}{7} z, \frac{2}{7} z, z \right) \mid z \in \mathbb{R} \right\}$$

$$\begin{aligned}
 z &= \frac{7}{2} y \\
 y &= \frac{2z}{7}
 \end{aligned}$$

$$\left( \begin{array}{ccc|c} 1 & 2 & -4 & 4 \\ 3 & -1 & +13 & 2 \\ 4 & 1 & a^2 & a+3 \end{array} \right)$$

$$\left( \begin{array}{ccc|c} 1 & 2 & -4 & 4 \\ 3 & -1 & +13 & 2 \\ 0 & -7 & +16+a^2 & a-13 \end{array} \right)$$

$$\left( \begin{array}{ccc|c} 1 & 2 & -4 & 4 \\ 0 & -4 & 25 & -10 \\ 0 & -4 & 16+a^2 & a-13 \end{array} \right)$$

$$\left( \begin{array}{ccc|c} 1 & 2 & -4 & 4 \\ 0 & -4 & 25 & -10 \\ 0 & 0 & -\frac{16+a^2}{9} & (a-\frac{13}{3}) \end{array} \right)$$

$$(a^2 - 9)z = u \rightarrow$$

$$(a+3)(a-3)$$

$$0 = a - 3$$

$$0 = 3 - 3$$

$$0 = 0$$

$$y = \frac{10+15x}{7} \quad a=3$$

$$x = \frac{4+4x}{7} \quad 0=0$$

$$\left( \frac{20+25x}{7} \right) \rightarrow z = x$$

$$z = \frac{1}{a+3}$$

$$a=3$$

$$0 = -6$$

$$\Rightarrow \emptyset$$

$$\frac{(a \neq 3, -3)}{2(a+3)(a-3)} = (a-3)$$

$$z = \frac{1}{a+3}$$

$$y = \frac{10+25}{a+3} = \frac{-10a-30-25}{7(a+3)} = \frac{10a+55}{7a+21}$$

$$x = h + \frac{h}{a+3} - 2 \cdot \left( \frac{10a+55}{7(a+3)} \right) = \frac{28a+28-20a-110}{7(a+3)} = \frac{8a-82}{7(a+3)}$$

$$z = t \quad a = 3$$

$$y = \frac{10+25t}{+7} = \frac{10+25t}{7}$$

$$x = h + ht - 2 \cdot \frac{10+25t}{7} = \frac{28+28t-20-50t}{7}$$

$$x = \frac{8-22t}{7}$$

$$\begin{pmatrix} 3 & +1 & -1 & | & a \\ 1 & -1 & +2 & | & b \\ 5 & +3 & -4 & | & c \end{pmatrix}$$

$$\cdot (-3) \left. \begin{array}{l} \leftarrow \\ \leftarrow \end{array} \right\} +$$

$$\begin{pmatrix} 0 & 4 & -7 & | & a \\ 1 & -1 & 2 & | & b \\ 5 & +3 & -4 & | & c \end{pmatrix}$$

$$\begin{pmatrix} 1 & -1 & 2 & | & b \\ 0 & 4 & -7 & | & a-3b \\ 0 & 8 & -14 & | & c-5b \end{pmatrix} \begin{array}{l} \\ \cdot (-2) \\ \leftarrow \end{array}$$

$$\sim \begin{pmatrix} 1 & -1 & 2 & | & b \\ 0 & 4 & -7 & | & a-3b \\ 0 & 0 & 0 & | & -2a+b+c \end{pmatrix}$$

$$z = -2a + b + 4c$$

$$\begin{pmatrix} 1 & -1 & 2 & | & b \\ 0 & 4 & -7 & | & a-3b \\ 5 & +3 & -4 & | & c \end{pmatrix} \begin{array}{l} \\ \\ / \cdot (-5) \end{array}$$

$$\left. \begin{array}{l} \leftarrow \\ \leftarrow \end{array} \right\} \oplus$$

žádné řešení pro  $c + b - 2a \neq 0$   
 nekonečně mnoho řešení pro  $b - 2a = 0$

$$x = (b+a-t)/4$$

$$y = (a-3b+7t)/4$$

$$z = t$$