

1. Jistý muž má 5 kabátů, 3 vesty a dvoje kalhoty. Kolika různými způsoby se může obléci (po oblečení má na sobě jednu vestu, jedny kalhoty a jeden kabát)?

2. Řešte $|x - 3| + 2x = |2x - 3|$.

3. Vypočtěte

$$\begin{vmatrix} -1 & 0 & -2 & -3 \\ -4 & 1 & 2 & 0 \\ -3 & 1 & 1 & -1 \\ 0 & 6 & 1 & 1 \end{vmatrix}$$

4. Vypočítejte inverzní matici A^{-1} k matici A a proveďte zkoušku: $A = \begin{pmatrix} 4 & 0 & 0 \\ 2 & -2 & 1 \\ 1 & 0 & 2 \end{pmatrix}$.

5. Vyřešte soustavu lineárních rovnic

$$\begin{aligned} x_1 - x_2 + 5x_3 &= 1 \\ x_1 - 2x_2 + 3x_3 &= -1 \\ 2x_1 - 3x_2 + 9x_3 &= 0 \\ 2x_1 - 4x_2 + 8x_3 &= -2 \end{aligned}$$

② N.B. $x_1 = 3, x_2 = \frac{3}{2}$

x	$(-\infty, \frac{3}{2})$	$(\frac{3}{2}, 3)$	$(3, +\infty)$
$ x-3 $	$3-x$	$3-x$	$x-3$
$ 2x-3 $	$3-2x$	$2x-3$	$2x-3$
$ x-3 + 2x = 2x-3 $	$3-x+2x = 3-2x$	$3-x+2x = 2x-3$	$x-3+2x = 2x-3$
	$3x = 0$	$x = 6 \notin (\frac{3}{2}, 3)$	$x = 0 \notin (3, +\infty)$
	<u>$x = 0 \in (-\infty, \frac{3}{2})$</u>		
		<u>$x = \{0\}$ ✓</u>	

① $C_1(5) \cdot C_1(3) \cdot C_1(2) = \frac{5!}{4!1!} \cdot \frac{3!}{2!1!} \cdot \frac{2!}{1!1!} = 5 \cdot 3 \cdot 2 = \underline{\underline{30}}$ ✓

③
$$\begin{vmatrix} -1 & 0 & -2 & -3 \\ -4 & 1 & 2 & 0 \\ -3 & 1 & 1 & -1 \\ 0 & 6 & 1 & 1 \end{vmatrix} \sim \begin{vmatrix} -1 & 0 & -2 & -3 \\ 0 & 1 & 10 & 12 \\ 0 & 1 & 3 & 8 \\ 0 & 6 & 1 & 1 \end{vmatrix} = (-1) \cdot (-1)^2 \begin{vmatrix} 1 & 10 & 12 \\ 1 & 3 & 8 \\ 6 & 1 & 1 \end{vmatrix} = - \begin{vmatrix} 0 & 3 & 4 \\ 1 & 3 & 8 \\ 0 & -41 & -47 \end{vmatrix} =$$

$$= -1 \cdot 1 \cdot (-1)^3 \begin{vmatrix} 3 & 4 \\ -41 & -47 \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 9 \end{vmatrix} = 27 - 4 = \underline{\underline{23}}$$
 ✓

$$\textcircled{4} \quad (A | E_3) \cong \left(\begin{array}{ccc|ccc} 4 & 0 & 0 & 1 & 0 & 0 \\ 2 & -2 & 1 & 0 & 1 & 0 \\ 1 & 0 & 2 & 0 & 0 & 1 \end{array} \right) \sim \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{1}{4} & 0 & 0 \\ 0 & -2 & 1 & -\frac{3}{4} & 1 & 0 \\ 0 & 0 & 2 & -\frac{1}{4} & 0 & 1 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{1}{4} & 0 & 0 \\ 0 & -2 & 1 & -\frac{3}{4} & 1 & 0 \\ 0 & 0 & 1 & -\frac{1}{8} & 0 & \frac{1}{2} \end{array} \right) \sim \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{1}{4} & 0 & 0 \\ 0 & -2 & 0 & -\frac{3}{8} & 1 & -\frac{1}{2} \\ 0 & 0 & 1 & -\frac{1}{8} & 0 & \frac{1}{2} \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{1}{4} & 0 & 0 \\ 0 & 1 & 0 & \frac{3}{16} & -\frac{1}{2} & \frac{1}{4} \\ 0 & 0 & 1 & -\frac{1}{8} & 0 & \frac{1}{2} \end{array} \right) \checkmark = (E_3 | A^{-1})$$

$$A^{-1} = \frac{1}{16} \left(\begin{array}{ccc} 4 & 0 & 0 \\ -6 & 16 & -8 \\ -2 & 0 & 8 \end{array} \right) \left(\begin{array}{ccc} 4 & 0 & 0 \\ 3 & -8 & 4 \\ -2 & 0 & 8 \end{array} \right)$$

$$\textcircled{5} \quad \left(\begin{array}{ccc|c} 1 & -1 & 5 & 1 \\ 1 & -2 & 3 & -1 \\ 2 & -3 & 9 & 0 \\ 2 & -4 & 8 & -2 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & -1 & 5 & 1 \\ 0 & -1 & -2 & -2 \\ 0 & -1 & -1 & -2 \\ 0 & -2 & -2 & -4 \end{array} \right) \sim$$

$$\sim \left(\begin{array}{ccc|c} 1 & -1 & 5 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 2 & 0 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & -1 & 5 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{array} \right) \text{ad}$$

$$\underline{x_3 = 0}$$

$$x_2 + 2 \cdot 0 = 2$$

$$\underline{x_2 = 2}$$

$$x_1 - (2) + 5 \cdot 0 = 1$$

$$x_1 - 2 = 1$$

$$\underline{x_1 = 3}$$

$$\underline{\underline{(3, 2, 0) \checkmark}}$$