Matice

$1x + 3y = 4$

$2x + 3y = 5$ −

$x = 1$

$1 + 3y = 4$

$3y = 3 \mid :3$

$y = 1$

$\begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$

A b

$3^{-1} = \frac{1}{3}$

$3X = 9 \mid \cdot 3^{-1}$

$3^{-1} \cdot 3 \cdot X = 3^{-1} \cdot 9 \rightarrow X = 3$

$1 \qquad \frac{1}{3} \cdot 9 = 3$

$X \cdot A = b \mid :A$

$X = b$

A

$X \cdot A = b \mid \cdot A^{-1}$

Пр. 2

$$\begin{cases} x + 2y + 3z = 4 \\ 4x - 2y - z = 1 \\ y - z = 2 \end{cases}$$

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

$Ax = b \quad / \cdot A^{-1}$

$I \leftarrow \boxed{A^{-1} A} x = A^{-1} b$

$I \cdot x = A^{-1} b$

$\boxed{x = A^{-1} b}$

$x \cdot A^T = b$

$x \cdot A^T (A^T)^{-1} = b (A^T)^{-1}$

$x \cdot I = b \cdot (A^T)^{-1}$

$\boxed{x = b \cdot (A^T)^{-1}}$

$(A^{-1} \cdot A = I)$

$I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

pouze pro čtvercové matice

Def. $A^{-1} = \frac{1}{\det(A)} \cdot \operatorname{adj} A$

$\det(A) = 0 \rightarrow$ matice nemá inverzní matici (singulární)

$A^{m\times n} + B^{m\times n}$

$A - B$

stejná velikost

$A^{2\times 2} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$

$B^{2\times 3} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$

$C = \begin{pmatrix} 2 & 1 & 0 \\ 0 & 1 & 2 \end{pmatrix}$ 2×3

$B^{2\times 3} - C^{2\times 3} = \begin{pmatrix} 1-2 & 0-1 & 0-0 \\ 0-0 & 1-1 & 0-2 \end{pmatrix} = \begin{pmatrix} -1 & -1 & 0 \\ 0 & 0 & -2 \end{pmatrix}$

skalár = číslo

(4) $\cdot A = \begin{pmatrix} 4 & 4 \\ 4 & 4 \end{pmatrix}$

↓ matice

$\vec{v} = (1 \quad 2)$

násobení matic

$$A^{3\times 2} \cdot B^{2\times 3} = C^{3\times 3}$$

$$C^{1\times 4} \cdot B^{5\times 2} \neq$$

$$E = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$$

$$F = \begin{pmatrix} 4 & 5 \\ 6 & -1 \end{pmatrix}$$

$$E^{2\times 2} \cdot F^{2\times 2} = G^{2\times 2}$$

$$E \cdot F = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix} \cdot \begin{pmatrix} 4 & 5 \\ 6 & -1 \end{pmatrix} = \begin{pmatrix} 1\cdot 4 + 2\cdot 6 & 1\cdot 5 + 2\cdot(-1) \\ 0\cdot 4 + 3\cdot 6 & 0\cdot 5 + 3\cdot(-1) \end{pmatrix}$$

$$= \begin{pmatrix} 16 & 3 \\ 18 & -3 \end{pmatrix}$$

$E = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$

$F = \begin{pmatrix} 4 & 5 \\ 6 & -1 \end{pmatrix}$

E . F

	4	5
	6	-1
1 2	16	3
0 3	18	-3

E . F × F . E

F . E

	1	2
	0	3
4 5	4	23
6 -1	6	9

$E.F = \begin{pmatrix} 16 & 3 \\ 18 & -3 \end{pmatrix}$ $F.E = \begin{pmatrix} 4 & 23 \\ 6 & 9 \end{pmatrix}$

Definice $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$$\det(A) = a \cdot d - b \cdot c$$

$$adj(A) = \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$$A^{-1} = \frac{1}{\det(A)} \cdot adj(A)$$

$$\boxed{A^{-1} = \frac{1}{ad - b \cdot c} \cdot \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}}$$

$$\begin{cases} 1x + 3y = 4 \\ 2x + 3y = 5 \end{cases} \rightarrow \underset{1\times 2}{\begin{pmatrix} x & y \end{pmatrix}} \cdot \underset{2\times 2}{\begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix}^T} = \underset{1\times 2}{\begin{pmatrix} 4 & 5 \end{pmatrix}}$$

1. způsob

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

$$\det(A^T) = 1 \cdot 3 - 2 \cdot 3 = -3$$

$$adj(A^T) = \begin{pmatrix} 3 & -2 \\ -3 & 1 \end{pmatrix}$$

$$A^{-1} = \frac{1}{\det(A^T)} \cdot adj(A^T)$$

$$A^{-1} = \frac{1}{-3} \cdot \begin{pmatrix} 3 & -2 \\ -3 & 1 \end{pmatrix}$$

$$A^{-1} = \begin{pmatrix} -1 & 2/3 \\ 1 & -1/3 \end{pmatrix}$$

$$X = b \cdot (A^T)^{-1}$$

$$(x \; y) = (4 \; 5) \cdot \begin{pmatrix} -1 & 2/3 \\ 1 & -1/3 \end{pmatrix}$$

$$(x \; y) = (-4+5 \quad 8/3 - 5/3)$$

$$(x \; y) = (1 \quad 1)$$

$$1x + 3y = 4$$
$$2x + 3y = 5 \rightarrow$$

$$\begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$$

2. způsob

$$\det(A) = 1 \cdot 3 - 2 \cdot 3 = -3$$

$$adj(A) = \begin{pmatrix} 3 & -3 \\ -2 & 1 \end{pmatrix}$$

$$A^{-1} = \frac{1}{\det(A)} \cdot adj(A)$$

$$A^{-1} = \frac{1}{-3} \cdot \begin{pmatrix} 3 & -3 \\ -2 & 1 \end{pmatrix}$$

$$A^{-1} = \begin{pmatrix} -1 & 1 \\ 2/3 & -1/3 \end{pmatrix}$$

$$X = A^{-1} \cdot b$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 & 1 \\ 2/3 & -1/3 \end{pmatrix} \cdot \begin{pmatrix} 4 \\ 5 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 \cdot 4 + 1 \cdot 5 \\ 2/3 \cdot 4 - 1/3 \cdot 5 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$x + y + z = 1$$
$$x - y + z = 2$$

$$z = t, \quad t \in \mathbb{R}$$

$$x + y = 1 - t$$
$$x - y = 2 - t$$

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

$$x_1 - 2x_2 + 3x_3 = 9$$
$$-x_1 + 3x_2 - x_3 = -6$$
$$2x_1 - 5x_2 + 5x_3 = 17$$

$X \quad \cdot \quad A \qquad\qquad b$

$$(x_1 \; x_2 \; x_3) \cdot \begin{pmatrix} 1 & -2 & 3 \\ -1 & 3 & -1 \\ 2 & -5 & 5 \end{pmatrix} = (9 \quad -6 \quad 17)$$

$$X \cdot A^T = b \quad | \cdot (A^T)^{-1}$$

$$X = b \cdot (A^T)^{-1}$$

$x + 3y = 4$

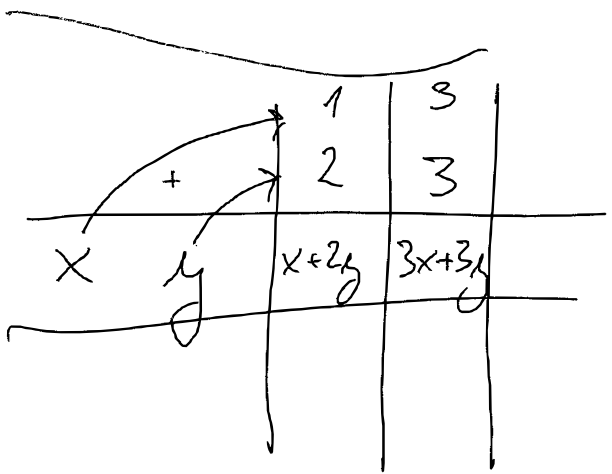
$2x + 3y = 5$

$$\overbrace{(x\ y)}^{x} \cdot A^T = b$$

$$x = b \cdot (A^T)^{-1}$$

1×2 2×2 T

$$(x\ y) \cdot \begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix} = (4\ 5)$$



$$(x+2y \quad 3x+3y) = (4\ 5)$$

$$(x\ y) \cdot \begin{pmatrix} 1 & 2 \\ 3 & 3 \end{pmatrix} = (4\ 5)$$

$$x + 3y = 4$$
$$2x + 3y = 5$$

$$\begin{pmatrix} 1 & 3 \\ 2 & 3 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$$

	x y	
1 3	$x+3y$	
2 3	$2x+3y$	

$$x + 3y = 4$$
$$2x + 3y = 5$$

$$\begin{pmatrix} 1 & -2 & 3 \\ -1 & 3 & -1 \\ 2 & -5 & 5 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 9 \\ -6 \\ 17 \end{pmatrix}$$

$$A \cdot x = b \quad | \cdot A^{-1}$$

$$x = A^{-1} \cdot b$$