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$$1\cdot x_1 - 3x_2 + x_3 = 1 \quad /\cdot(-2) \quad /\cdot(-1)$$
$$2x_1 - x_2 - 2x_3 = 2$$
$$1\cdot x_1 + 2x_2 + 3x_3 = -1$$

$$x_1 - 3x_2 + x_3 = 1$$
$$+5x_2 - 4x_3 = 0 \quad /\cdot(-1)$$
$$5x_2 - 4x_3 = -2$$

$$x_1 - 3x_2 + x_3 = 1$$
$$5x_2 - 4x_3 = 0$$
$$\boxed{0 = -2} \quad \lightning$$

немогуће

$$x_2 - x_3 = 0$$
$$x_1 - 3x_3 = -1$$
$$-x_1 + 3x_2 = 1$$

$$x_1 - 3x_3 = -1 \quad /\cdot 1$$
$$x_2 - x_3 = 0$$
$$-x_1 + 3x_2 = 1$$

$$x_1 - 3x_3 = -1$$
$$x_2 - x_3 = 0 \quad /\cdot(-3)$$
$$3x_2 - 3x_3 = 0$$

$$x_1 - 3x_3 = -1$$
$$x_2 - x_3 = 0$$
$$\boxed{0 = 0}$$

∞ много реш.

$x_3 = t,\ t \in \mathbb{R}$

$x_1 = 3t - 1,\quad x_2 = t$

$$2x_1 - x_2 - 2x_3 = 2$$
$$x_1 - 3x_2 + x_3 = 1$$
$$x_1 + 2x_2 - 3x_3 = -1$$

$$-3x_2 + x_1 + x_3 = 1$$
$$-x_2 + 2x_1 - 2x_3 = 2$$
$$2x_2 + x_1 - 3x_3 = -1$$

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(D) $\quad x_1 = \frac{D_1}{D}, \ldots, x_n = \frac{D_n}{D}$

$Ax = b$

$D \neq 0 : \det(A) \neq 0 \Rightarrow \exists A^{-1} : x = A^{-1} \cdot b$

$$x = \underbrace{\frac{1}{\det(A)} \cdot Adj(A)}_{A^{-1}} \cdot b$$

$$Adj(A) = \begin{bmatrix} C_{11} & \cdots & C_{n1} \\ \vdots & & \vdots \\ C_{1n} & \cdots & C_{nn} \end{bmatrix} \qquad x = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}, \quad b = \begin{bmatrix} b_1 \\ \vdots \\ b_n \end{bmatrix}$$

$$x_i = \frac{1}{\underset{= D}{\det(A)}} \cdot \underbrace{(C_{1i} \cdot b_1 + C_{2i} \cdot b_2 + \ldots + C_{ni} \cdot b_i)}_{D_i}$$

$$x_i = \frac{D_i}{D}$$

$\boxed{X}$

$x_i = \frac{D_i}{D} \qquad D = 0$

$\hookrightarrow \quad x_i \cdot D = D_i$

$(D=0): \quad x_i \cdot 0 = D_i$

$\quad D_i \neq 0 : \quad x_i \cdot 0 = 7 \quad ↯$

$\quad D_i = 0 : \quad x_i \cdot 0 = 0 \quad \infty$

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D 1) $\text{rang}(A_{m\times n}) = n$

$\bar{A} = \left[\begin{array}{c|c} A & \begin{matrix} 0 \\ \vdots \\ 0 \end{matrix} \end{array} \right]$, $\text{rang}(\bar{A}) = n$

$\Rightarrow \text{rang}(A) = \text{rang}(\bar{A}) = n$

$\overset{KKT}{\Rightarrow} \exists!$ rešenje (! → jedinstveno)

$Ax = 0$ uvek ima $x = 0$

$\Rightarrow$ Trivijalno reš. je jedino reš.

2) $\boxed{\Rightarrow}$ $\exists$ i netrivijalno rešenje $\Rightarrow \exists \infty$ mnogo

$\overset{KKT}{\Rightarrow}$ $\text{rang}(A) < n$

$\boxed{\Leftarrow}$ $\text{rang}(A) < n \overset{KKT}{\Rightarrow} \exists \infty$ mnogo reš.

$\Rightarrow$ jedno je trivijalno + sigurno još jedno netrivijalno (∞)

$\boxtimes$

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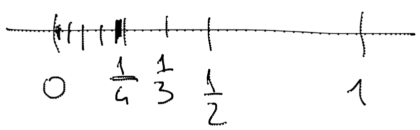
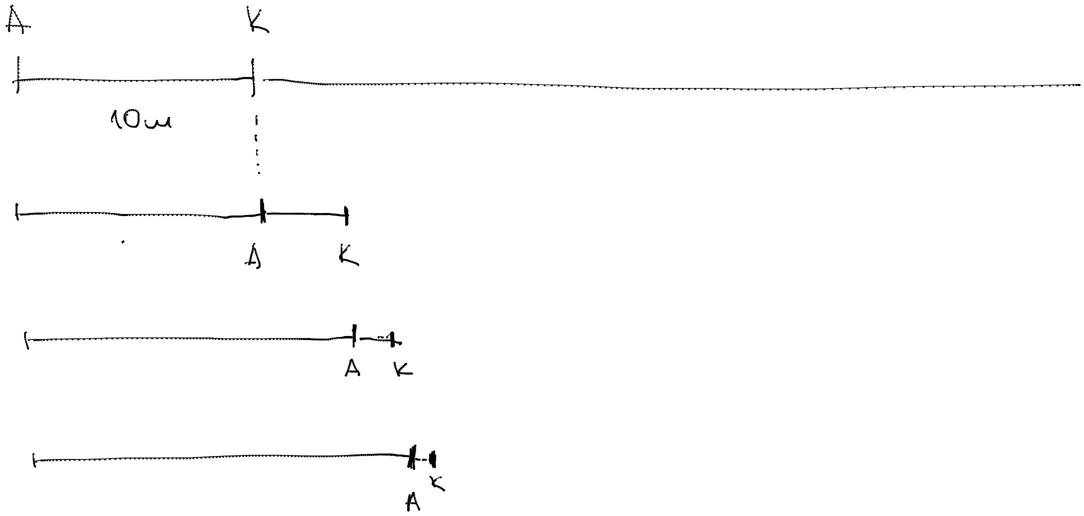
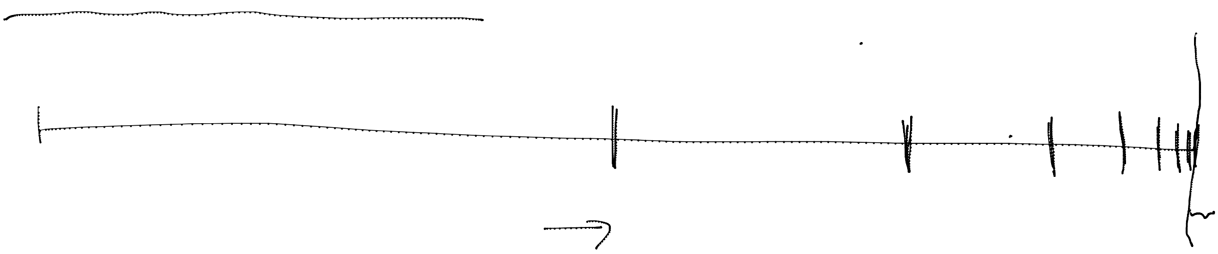
$\{a_n\}$, $a_n = \frac{1}{n}$: $\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$



$$\sum_{n=1}^{\infty} a_n = ?$$

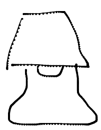
$$a_1 + a_2 + a_3 + \dots = ?$$





a_n : $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$ $\qquad a_n \neq 0$, $\lim a_n = 0$

$$\sum_{n=1}^{\infty} a_n = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots = 1$$



$1 \uparrow \quad \frac{1}{2} \downarrow \quad \frac{1}{4} \uparrow \quad \frac{1}{8} \downarrow \quad \dots$

$$1 + \underbrace{\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots} = 1 + \sum_{n=1}^{\infty} \frac{1}{2^n} = 2$$

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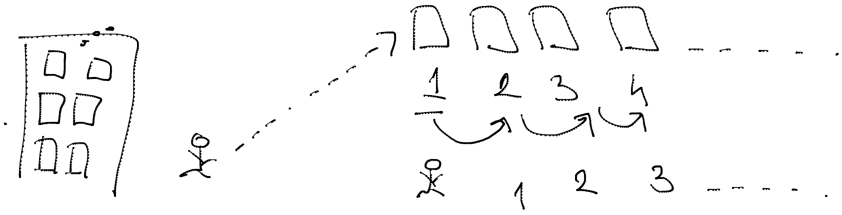
$\frac{1}{3} = 0.3333.....$ $\quad \cdot 3$

$1 = 0.9999.....$

Def: Svaka 2 različita realna broja moraju imati 1 broj između njih.

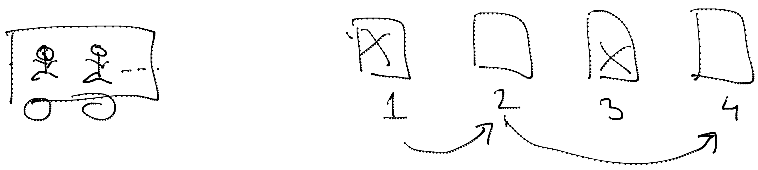
0,12345
0,12346 $>$ 0,12345 5...

Hilbert



$O(n)$

$O(n^2)$



$O(n)$