2DL60I-201005:

Indien vragen, stel ze maar!

(3.2) 3d)
$$\begin{pmatrix} x & 1 \\ \alpha & x \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$x + y$

$c \cdot x$ $\quad 0 \begin{pmatrix} \alpha & 1 \\ \alpha & \alpha \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \neq 1$

3e)
$$\begin{pmatrix} 0 & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{pmatrix} + \begin{pmatrix} 0 & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{pmatrix} = \begin{pmatrix} 0 & \alpha \\ \alpha & \alpha \end{pmatrix}$$

$$c \begin{pmatrix} 0 & x \\ \alpha & \alpha \end{pmatrix} = \begin{pmatrix} 0 & \alpha \\ \alpha & x \end{pmatrix}$$

dus lin. deelruimte

4

$$\boxed{A x = \underline{0}}$$

4d)
$$\left(\begin{array}{cccc|c} 1 & 1 & -1 & 2 & 0 \\ 2 & 2 & -3 & 1 & 0 \\ -1 & -1 & 0 & -5 & 0 \end{array}\right)$$

-2

$+1$

(-1)
$$\left(\begin{array}{cccc|c} 1 & 1 & -1 & 2 & 0 \\ 0 & 0 & +1 & +3 & 0 \\ 0 & 0 & -1 & -3 & 0 \end{array}\right) +1$$

$$\left(\begin{array}{cccc|c} 1 & 1 & 0 & 5 & 0 \\ 0 & 0 & 1 & 3 & 0 \end{array}\right)$$

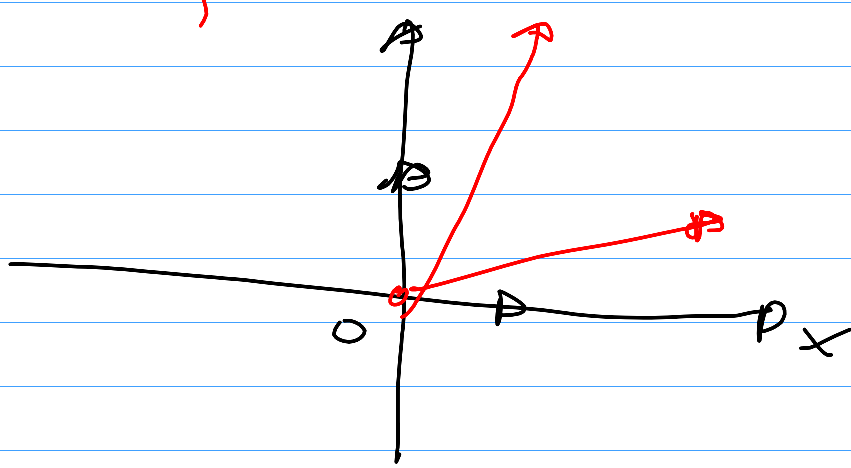
$\underline{x} = (x_1, x_2, x_3, x_4)$

$x_1 = -x_2 - 5x_4$

$x_3 = -3x_4$

$\underline{x} = (-x_2 - 5x_4, x_2, -3x_4, x_4)$

$= x_2(-1, 1, 0, 0) + x_4(-5, 0, -3, 1)$



8) $S =$ | waarvoor geldt dat

$\{\ldots\}$ verzameling.

$\{\underline{\underline{B}} \mid \underline{AB = BA}\}$

A is vaste matrix.

?? $A(\alpha B) = (\alpha B)A$

$(B = 0\,8)$

α scalar

(αB)?? $(\alpha B)A =$

$\alpha \cdot (B) \cdot A = \alpha\,(B \cdot A) =$ doel $= A(\alpha B)$

$\alpha\,(A \cdot B) = \alpha \cdot A \cdot B.$

$= A(\alpha B)$

scal verm.

opteling: $5 \cdot 2 = 2 \cdot 5$

??

$A(B+C) = (B+C)A$

$B, C \in S$ $\quad$ $AB = BA \quad AC = CA.$

$A(B+C) = AB + AC =$

$BA + CA = = (B+C)A$

$\begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} 3 & 1 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 3 & 1 \\ 5 & 3 \end{pmatrix}$ $\quad AB \neq BA$

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

(i.h.a niet commutatief.
operatie:. knip
$A \text{ knip } B = B \text{ knip } A$)

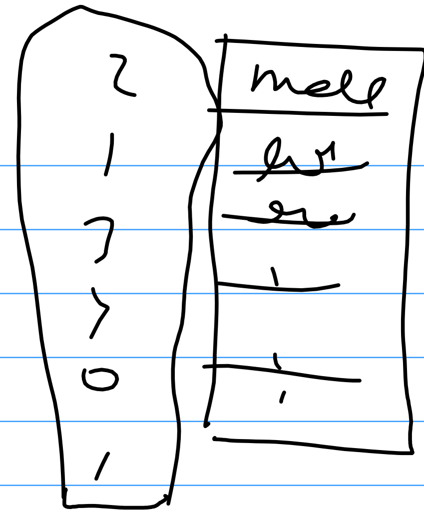
$(A \oplus B = B \oplus A)$
($\odot$ – niet goed)

span $\mathbb{R}^3$

span $\{A_1, A_2, A_3\}$
alle mogelijke lin. comb.
$\alpha_1, \alpha_2, \alpha_3$ scalaire
$\rightarrow \underline{\underline{\alpha_1}} A_1 + \underline{\underline{\alpha_2}} A_2 + \underline{\underline{\alpha_3}} A_3$

P_1 = jam met vijgen en citroen
P_2 = jam met aardbeien en suiker
P_3 = jam van kwetsen en rozemarijn.

$(1, 3, 1)$



pg (141) Ex 11 c

lin onafh

$\mathbb{R}^3 \rightarrow$ 3 richtingen

$$\underbrace{\left\langle \begin{pmatrix}1\\0\\1\end{pmatrix}, \begin{pmatrix}0\\1\\0\end{pmatrix} \right\rangle}_{2}$$

dim: 2

dim: 3

$$\mathbb{R}^3 \quad \underline{x} = \begin{pmatrix}x_1\\x_2\\x_3\end{pmatrix} = x_1\begin{pmatrix}1\\0\\0\end{pmatrix} + x_2\begin{pmatrix}0\\1\\0\end{pmatrix} + x_3\begin{pmatrix}0\\0\\1\end{pmatrix}$$

Ex 11 d) pg 141

$$\begin{pmatrix}4\\-1\\1\end{pmatrix}$$

Ex 3 b :

~~lin. onafh~~ : de ene vector niet als lin. comb. van andere vectoren

$$\begin{pmatrix} \alpha \\ \beta \\ \alpha \end{pmatrix} = \alpha \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} + \beta \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

als $\alpha = 0$, $\beta = 0$ de enige opl dan lin. onafh.

enige opl — $\beta = 0$, $\alpha = 0$

$$\alpha \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix} + \beta \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} + \gamma \begin{pmatrix} 4 \\ -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

-2, -4

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

$$\left(\begin{array}{ccc|c} 1 & 2 & 4 & 0 \\ 0 & -3 & -9 & 0 \\ 0 & -5 & -15 & 0 \end{array}\right) \left(\begin{array}{ccc|c} 1 & 2 & 4 & 0 \\ 0 & 1 & 3 & 0 \\ \cancel{0} & \cancel{1} & \cancel{3} & \cancel{0} \end{array}\right)$$

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

$x_1 = 2x_3$

$x_2 = -3x_3$

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 2x_3 \\ -3x_3 \\ x_3 \end{pmatrix}$$

$x_3 = 1 : (2, -3, 1) = x_3 \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}$

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

$$\underbrace{\begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}}, \underbrace{\begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}, \begin{pmatrix} 4 \\ -1 \\ 1 \end{pmatrix}}, \underbrace{\begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} \begin{pmatrix} 4 \\ -1 \\ 1 \end{pmatrix}}$$

2 dim deelruimte in $\mathbb{R}^3$

(vlak in $\mathbb{R}^3$ door O)

$\left\langle \begin{pmatrix} \cdot \\ \cdot \\ \cdot \end{pmatrix}, \begin{pmatrix} \cdot \\ \cdot \\ \cdot \end{pmatrix}, \begin{pmatrix} \cdot \\ \cdot \\ \cdot \end{pmatrix} \right\rangle$ lin onafh $\begin{vmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{vmatrix} = 0$

(3.3) 6)

$\left\{ \begin{array}{l} x_1, x_2, x_3 \text{ vectoren } \mathbb{R}^n \\ \text{lin. onafh.} \end{array} \right.$

$$\begin{cases} y_1 = x_1 + x_2 \\ y_2 = x_2 + x_3 \\ y_3 = x_3 + x_1 \end{cases}$$

$c_1 \cdot y_1 + c_2 y_2 + c_3 y_3 = 0 \ (\in \mathbb{R}^n)$

$c_1 (x_1 + x_2) +$

$c_2 (x_2 + x_3) + c_3 (x_3 + x_1) = 0$

$x_1 (c_1 + c_3) + x_2 (c_1 + c_2)$

$+ x_3 (c_2 + c_3) = 0$

$$\begin{cases} c_1 + c_3 = 0 \\ c_1 + c_2 = 0 \\ c_2 + c_3 = 0 \end{cases} \leadsto \left[\begin{array}{ccc|c} 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{array}\right]$$

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

$$\begin{pmatrix} 1 & 0 & 0 & | & 0 \\ 0 & 1 & 0 & | & 0 \\ 0 & 0 & 1 & | & 0 \end{pmatrix} \qquad \begin{aligned} c_1 &= 0 \\ c_2 &= 0 \\ c_3 &= 0 \end{aligned}$$

$$\begin{cases} y_1 = x_1 + x_2 \\ y_2 = x_2 + x_3 \\ y_3 = x_3 + x_1 \end{cases}$$

$$\underbrace{\langle x_1, x_2, x_3 \rangle}$$

$$y_{1_c} = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \quad y_{2_c} = \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, \quad y_{3_c} = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$$

(3.3) 2 l)

$\langle 1, x, x^2 \rangle \qquad p(x) = \alpha + \beta x + \gamma x^2$

$(\alpha, \beta, \gamma) \in \mathbb{R}^3$

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

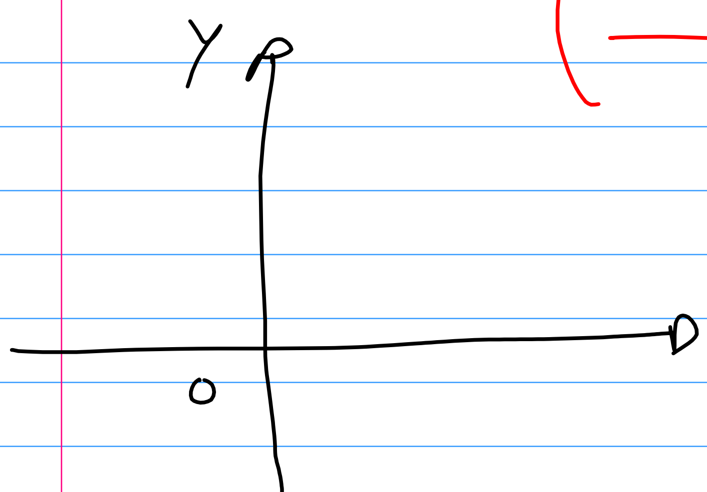
$$\Rightarrow \left(1, \frac{1}{2}, \frac{1}{6}, \frac{1}{24}, \ldots\right)$$

$(3,3)(2\ 6)$ $\qquad \underline{\underline{\mathbb{R}^3}} \leadsto \dim(\mathbb{R}^3) = 3$

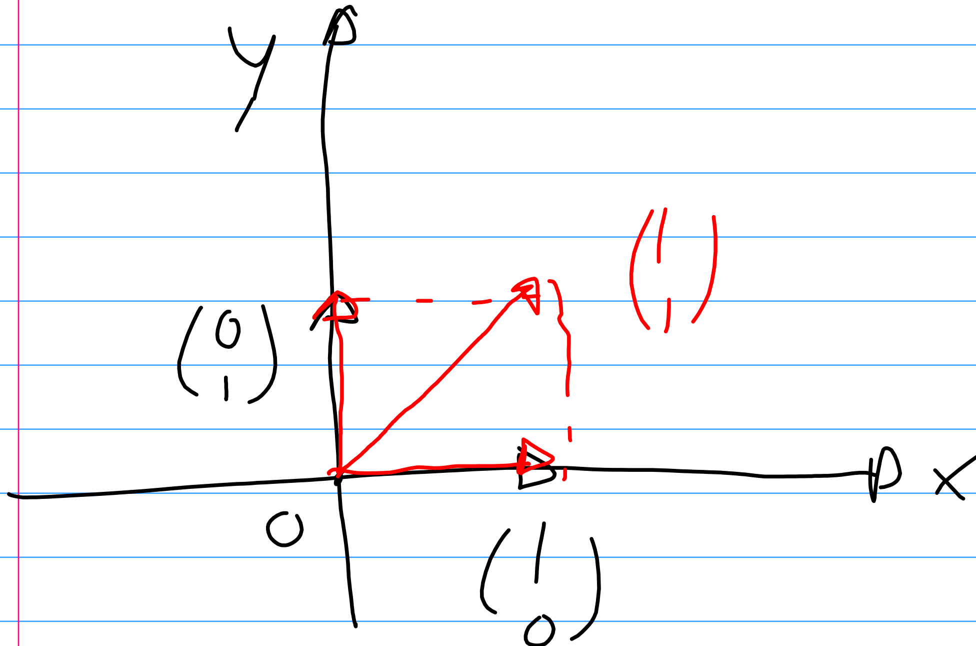
$\underline{\underline{\mathbb{R}^4}}$

$$\underbrace{2\begin{pmatrix}0\\1\\1\end{pmatrix} + \begin{pmatrix}1\\0\\1\end{pmatrix}} = \underline{\underline{\begin{pmatrix}1\\2\\3\end{pmatrix}}}$$

(<u>lin afh</u>
<u>van 2e en 3e</u>)



$\mathbb{R}^2$



$\binom{1}{0}, \binom{0}{1}, \binom{1}{1}$ ~~lin onafh~~

~~"Stel ze zijn lin onafh."~~

$\to \mathbb{R}^3$

2 dim $\to$ basis van 2 vecto

$c_1 y_1 + \dots + c_4 y_5 = 0$

$\binom{1}{0}, \binom{0}{1}, \binom{1}{1}$ $\left(\begin{array}{ccc|c} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{array}\right)$

$c_1 \binom{1}{0} + c_2 \binom{0}{1} + c_3 \binom{1}{1} = \binom{0}{0}$

$$y''(t) + y'(t) = 0$$

$e^{\lambda t}$ $\quad \lambda^2 + \lambda = 0 \quad \lambda = 0$

$\lambda = -1$

$$y_H(t) = \underbrace{\alpha + \beta e^{-t}}$$

$\langle 1, e^{-t} \rangle$ $\quad \alpha + \beta e^{-t} = 0 \quad \forall t$

$\underline{A}\,\underline{x} = \underline{b}$ $\quad \underline{A}\,\underline{x} = \underline{0}$

$$\underline{x} = \underline{x}_H + \underline{x}_p.$$