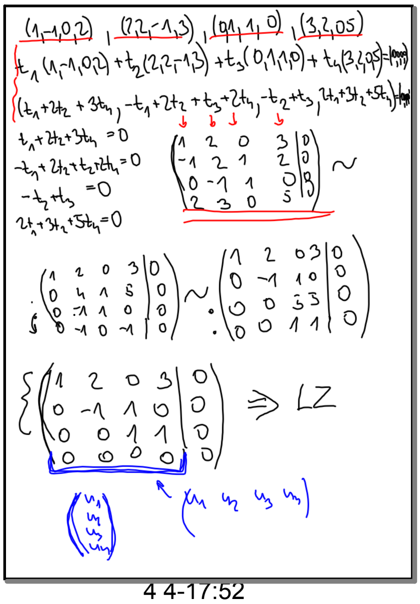
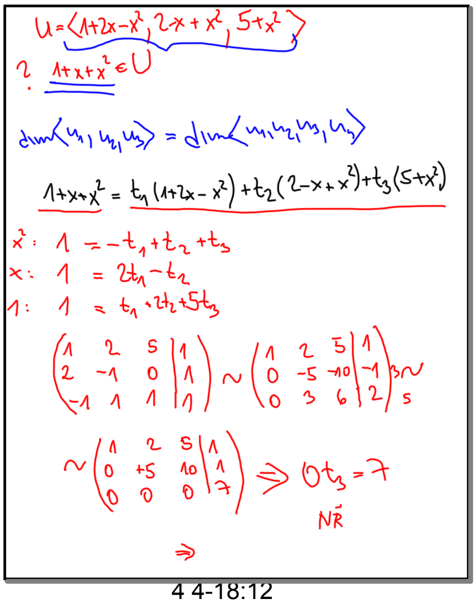
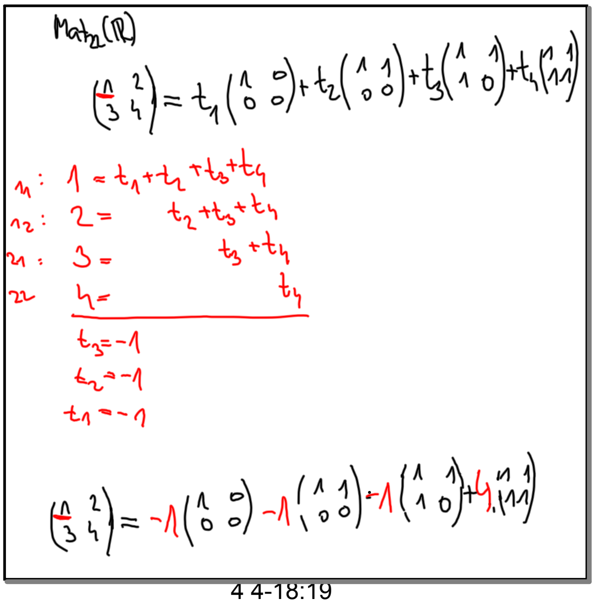


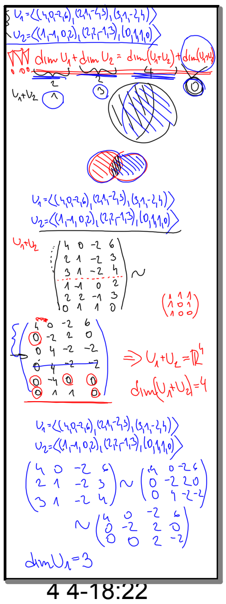
4 4-17:52



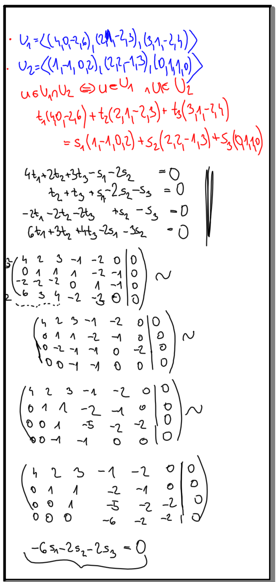
4 4-18:12



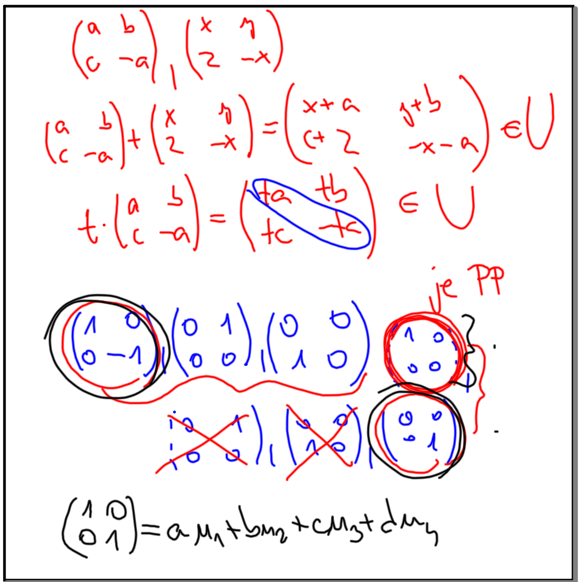
4 4-18:19



4 4-18:22



4 4-18:39



4 4-18:48

$\mathbb{R}_n[x] \quad n \geq 2$

- $U = \{ f \in \mathbb{R}_n[x] \mid f(2012) = f(2011) = 0 \}$

$f \in U \Rightarrow \exists g : f = \underbrace{(x-2012)(x-2011)} \cdot g$

$\text{st } g \leq n-2$

$g = a_{n-2} x^{n-2} + a_{n-3} \cdot x^{n-3} + a_{n-4} x^{n-4} + \ldots + a_1 x + a_0$

$n-1$ koeficientů

$\dim U = n-1$

$U = \langle x^{n-2}(x-2012)(x-2011), x^{n-3}(x-2012)(x-2011), \ldots x(x-2012)(x-2011), (x-2012)(x-2011) \rangle$

4 4-18:55

$V, v_1, \ldots, v_n \in V$

$S = \{ (c_1, \ldots, c_n) \mid \underbrace{c_1 v_1 + \ldots + c_n v_n = \underline{0}} \}$

i) S je podprostor $\mathbb{R}^n$

$a \in S, b \in S$

$a = (a_1, a_2, \ldots, a_n)$; $a_1 v_1 + \ldots + a_n v_n = \underline{0}$

$b = (b_1, b_2, \ldots, b_n)$; $b_1 v_1 + \ldots + b_n v_n = \underline{0}$

$a + b$

$(a_1 + b_1, a_2 + b_2, \ldots, a_n + b_n)$

$(a_1+b_1)v_1 + (a_2+b_2)v_2 + \ldots + (a_n+b_n)v_n =$

$= a_1 v_1 + b_1 v_1 + a_2 v_2 + b_2 v_2 + \ldots + a_n v_n + b_n v_n =$

$= \underbrace{a_1 v_1 + a_2 v_2 + \ldots + a_n v_n}_{\underline{0}} + \underbrace{b_1 v_1 + b_2 v_2 + \ldots + b_n v_n}_{\underline{0}} =$

$= \underline{0} + \underline{0} = \underline{0} \Rightarrow a + b \in S$

$t \in \mathbb{R}$

$t \cdot (a_1, a_2, \ldots, a_n) = (ta_1, ta_2, \ldots, ta_n)$

$ta_1 v_1 + ta_2 v_2 + \ldots + ta_n v_n =$

$t(\underbrace{a_1 v_1 + a_2 v_2 + \ldots + a_n v_n}_{\underline{0}}) = t \cdot \underline{0} = \underline{0}$

$\Rightarrow S$ je PP $\mathbb{R}^n$

$v_1, \ldots, v_n$ LN $\Leftrightarrow \dim S = 0$

"$\Rightarrow$" $v_1, \ldots, v_n$ LN $\Rightarrow t_1 v_1 + \ldots + t_n v_n = \underline{0} \Rightarrow$

$\underbrace{t_1 = t_2 = \ldots = t_n = 0}$

$\Rightarrow S = \{(0, 0, \ldots, 0)\} \Rightarrow \dim S = 0$

"$\Leftarrow$" $\dim S = 0 \Rightarrow S = \{(0, 0, 0, 0, \ldots, 0)\}$

$\Rightarrow \underbrace{t_1 v_1 + \ldots + t_n v_n} = \underline{0}$

$t_1 = \ldots = t_n = 0$

$\Rightarrow$ LN

4 4-19:01

$x + y + z = 0$

$y - z = 0 \Rightarrow y = z$

$x + 2y = 0$

$x = -2y$

$\{ \underbrace{(-2t, t, t)} \mid t \in \mathbb{R} \}$

pp $\mathbb{R}^3$

$$\left[\begin{pmatrix} a_{11} x_1 + a_{12} x_2 + \ldots + a_{1n} x_n = 0 \\ \vdots \\ a_{k1} x_1 + a_{k2} x_2 + \ldots + a_{kn} x_n = 0 \end{pmatrix} \right]$$

$\boxed{\begin{matrix} (r_1, \ldots, r_n) \\ (s_1, \ldots, s_n) \end{matrix}}$ $\quad (r_1 + s_1, \ldots, r_n + s_n)$

- $a_{11}(r_1 + s_1) + a_{12}(r_2 + s_2) + \ldots + a_{1n}(r_n + s_n) =$

$\underbrace{a_{i1} r_1 + \ldots + a_{in} r_n}_{0} + \underbrace{a_{i1} s_1 + \ldots + a_{in} s_n}_{0} = 0 \quad i \in \{1, \ldots, k\}$

$(tr_1, \ldots, tr_n)$

$a_{i1} tr_1 + \ldots + a_{in} tr_n =$

$t(\underbrace{a_{i1} r_1 + \ldots + a_{in} r_n}) = 0$

4 4-19:14

$\underline{(2, t, 6, 3)} = \underbrace{s_1(1, -2, 2, 0) + s_2(1, -2, 2, 3) + s_3(-1, 1, 0, 0)}$

$s_1 + s_2 - s_3 = 2 \quad \Rightarrow \underline{\underline{s_3 = 1}}$

$-2s_1 - 2s_2 + s_3 = t$

$2s_1 + 2s_2 = 6 \quad \Rightarrow s_1 = 2$

$3s_2 = 3 \quad \Rightarrow s_2 = 1$

$-2s_1 - 2s_2 + s_3 = t$

$-4 - 2 + 1 = t$

$\boxed{-5 = t}$

4 4-19:25

4 4-19:29

$W_1 = \{ (x, y, z) \mid x = 2y + 3z \}$

$= \{ (2t + 3s, t, s) \mid t, s \in \mathbb{R} \}$

$W_1 = \langle (3, 0, 1), (2, 1, 0) \rangle$

$\dim W_1 = 2$

$W_2 = \{ (r, -2r, -3r) \mid r \in \mathbb{R} \}$

$W_2 = \langle (1, -2, -3) \rangle$

$\dim W_2 = 1$

$W_1 + W_2 : \begin{pmatrix} 1 & -2 & -3 \\ 3 & 0 & 1 \\ 2 & 1 & 0 \end{pmatrix} \sim \begin{pmatrix} 1 & -2 & -3 \\ 0 & 6 & 10 \\ 0 & 5 & 6 \end{pmatrix} \sim$

$\sim \begin{pmatrix} 1 & -2 & -3 \\ 0 & 6 & 10 \\ 0 & 0 & -7 \end{pmatrix}$

$\dim(W_1 + W_2) = 3$

$\underbrace{W_1 + W_2 = \mathbb{R}^3}$

$\underbrace{\dim W_1}_{2} + \underbrace{\dim W_2}_{1} = \overbrace{\dim(W_1 + W_2)}^{3} + \underbrace{\dim(W_1 \cap W_2)}_{0}$

$W_1 \cap W_2 = \{(0, 0, 0)\}$

$W_1 + W_2 = V$

$W_1 \cap W_2 = \{\underline{0}\}$ $\quad W_1 \oplus W_2$

$W_1 \dot{+} W_2$

$(1, 1, 1, 1) \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$

4 4-19:29

4 4-18:34