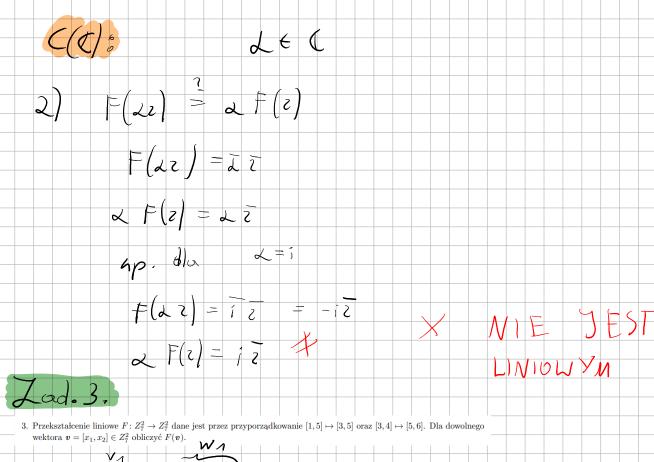
[MAT3] - 17 - Prelisitation linione Które z następujących przekształceń są liniowe? (a) $F: \mathbb{R}^2 \to \mathbb{R}^3$, $F([x_1, x_2]) = [x_1 x_2, 0, 0]$ F: We linique, gdy: 1) Y u, v eV : F(y) = F(y) + F(y) 2) Yuev Y X EIK: F(X 4) = X F(V) 2) F(Lu) = F([2x1/2x2]) = [2x1/2,0,6] $\angle F(u) = \angle \cdot F([x_1,x_1]) = \angle [x_1x_1,0,0] = [ax_1x_1,0,0]$ $\left(x^{2} \times_{1} \times_{2}, 0, 0\right) \neq \left[x \times_{1} \times_{2}, 0, 0\right]$ all $\left(x \times_{1} \times_{2}, 0, 0\right)$ X NIT JEST LINIOWE (b) $F: \mathbb{R}^2 \to \mathbb{R}^3, F([x_1, x_2]) = [x_1 + 2x_2, x_1 - x_2, x_1]$ $F(u) = F([\times_1 \times_2])$ 1) $F(y) + F(v) = F([\times_1/\times_1]) + F([y_1/y_2]) =$ $= \left[\times 1/2 \times 2/\times 1 \times 2/\times 1 \right] + \left[y_1 + 2y_2 / y_1 - y_2 / y_1 \right] =$ $+\left(x_1,y_1+2\left(x_2+y_2\right), x_1+x_2+y_1+y_2, x_1+y_1\right)$ $F(u + v) = \left[\times_1 + y_1 + 2 \left(\times_2 + y_2 \right) \times_1 + y_1 - \times_2 - y_2 \right] \times_1 + y_1$ 2) $\chi F(u) = F(\chi u)$ LNOW 2 F(U) = 2 F([>1/>2]) = 2 [x12 x2/x1-x2/x]

$$F: \mathbb{R}^{3} \rightarrow \mathbb{R}^{2}, F(x_{1}, x_{2}, x_{3})] = [x_{1} + 2, x_{2}] \qquad \text{with } [x_{1}, x_{1}, x_{3}] \qquad V = [y_{1}, y_{2}, y_{3}]$$

$$\int F(\omega) V = [x_{1} + 2, x_{2}] \qquad \text{with } [x_{1}, x_{2}, x_{3}] \qquad = [x_{2} + y_{3} + y_{3} + x_{3} + y_{3}] \qquad \text{with } [x_{2} + y_{3} + y_{3} + x_{3} + y_{3}] \qquad \text{with } [x_{2} + y_{3} + y_{3} + x_{3} + y_{3}] \qquad \text{with } [x_{2} + y_{3} + y_{3} + y_{3} + y_{3}] \qquad \text{with } [x_{2} + y_{3} +$$



$$A = \begin{bmatrix} 35 \\ 56 \end{bmatrix} \begin{bmatrix} 66 \\ 35 \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$$

$$F(v) = \begin{bmatrix} 5x_1 + x_2 \\ 6x_1 + 4x_2 \end{bmatrix}$$



5. Dla każdego z podanych przekształceń liniowych F wyznaczyć macierz przekształcenia w bazach standardowych odpowiednich przestrzeni wektorowych. Podać bazy i wymiary podprzestrzeni jądra KerF i obrazu ImF.

(a)
$$F: \mathbb{R}^3 \to \mathbb{R}^2$$
, $F([x_1, x_2, x_3]) = [x_1 + x_2, x_2 + x_3]$

$$F\left(\begin{bmatrix} 1,0,0 \end{bmatrix}\right) = \begin{bmatrix} 1,0 \end{bmatrix}$$

$$F\left(\begin{bmatrix} 0,1,0 \end{bmatrix}\right) = \begin{bmatrix} 1,1 \end{bmatrix}$$

$$F([o,o,1]) = [o,1]$$

Jadro Nert - to zbión wszysthich wehterów tahich, ie
$$F(u) = [o, o) ... T A \cdot x = 0$$

$$\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 6 \\ 6 \end{bmatrix}$$

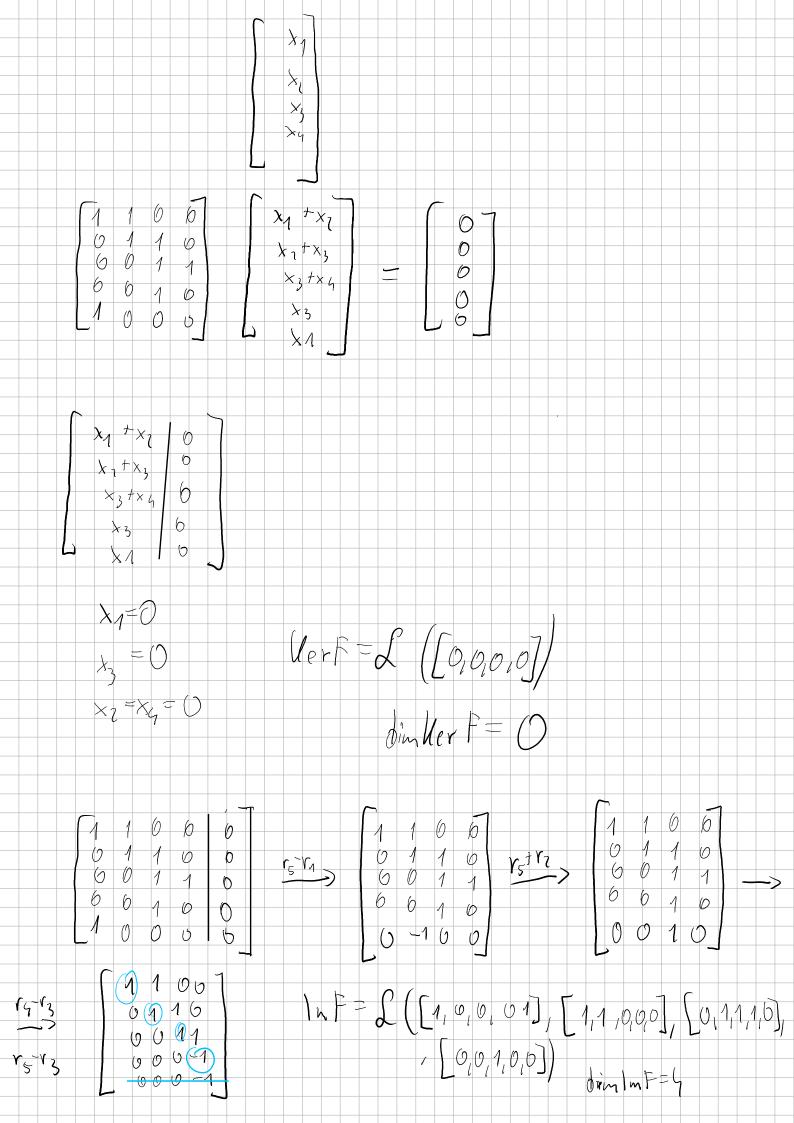
$$\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 + x_1 \\ x_1 + x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} \times_{1}, \times_{2}, \times_{5} \end{bmatrix} = \times_{1} \begin{bmatrix} 1, -1, 1 \end{bmatrix} = + \begin{bmatrix} 1, -1, 1 \end{bmatrix}$$

$$\text{KerF} = \lambda \left(\begin{bmatrix} 1, -1, 1 \end{bmatrix} \right)$$

$$\frac{d_{1}m(R^{2})}{d_{1}m(R^{2})} = \frac{3}{3}$$

$$\frac{d_{1}m(R^{2})}{d_$$



(e)
$$F: \mathbb{R}^4 \to \mathbb{R}^3$$
, $F([x_1, x_2, x_3, x_4]) = [2x_1 + x_3, 2x_2 - x_4, x_3 + 2x_4]$

$$| bitom | S|_{2x_1} |_{XY} |_{\partial \mathbb{R}^2} = [1, 0, 0, 0] ; [0, 1, 0, 0] ; [0, 0, 1, 0] ; [0, 0, 1, 0] ; [0, 0, 0, 1]$$

$$| F([x_1, 0, 0, 0])| = [x_1, 0, 0] ; [x_1, 0] ; [x_2, 0] ; [x_1, 0] ; [x_2, 0] ; [x_2$$