Fușneică Florentin-Cristian

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Lucrare 1

3. $f:\mathbb{R}^3 \to \mathbb{R}^3$, $f(x)=(x_1, x_2, x_1+x_2+x_3)$

a) $\operatorname{Ker} f=\{x\in\mathbb{R}^3 \mid f(x)=(0,0,0)\}$

$$\Rightarrow \begin{cases} x_1=0 \\ x_1=0 \\ x_1+x_2+x_3=0 \end{cases} \Rightarrow x_2=-x_3$$

$$\Rightarrow \operatorname{Ker} f=\{(0, x_2, -x_2) \mid x_2\in\mathbb{R}\}$$
$$=\{x_2(0,1,-1) \mid x_2\in\mathbb{R}\}$$

b) $\operatorname{Im} f=\{v\in\mathbb{R}^3 \mid \exists y\in\mathbb{R}^3 \text{ a.î. } f(y)=v\}$

Fie $y=(y_1,y_2,y_3)$ și $v=(v_1,v_2,v_3)$

$f(y)=v \Leftrightarrow$

$$\Leftrightarrow \begin{cases} y_1=v_1 \\ y_1=v_2 \\ y_1+y_2+y_3=v_3 \end{cases} \Rightarrow \bar{M}=\left(\begin{array}{ccc|c} 1 & 0 & 0 & v_1 \\ 1 & 0 & 0 & v_2 \\ 1 & 1 & 1 & v_3 \end{array}\right)$$

$\det M=0$

$$\Delta_C=\begin{vmatrix} 1 & 0 & v_1 \\ 1 & 0 & v_2 \\ 1 & 1 & v_3 \end{vmatrix}=v_1-v_2$$