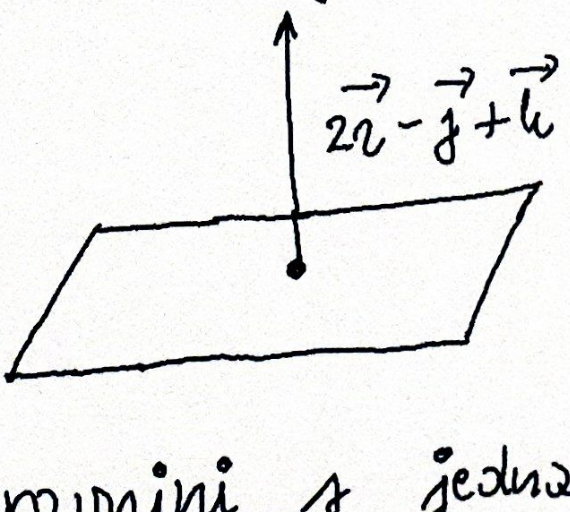
3. Zad, poglavlje 3.5.

a) $\vec{a_1} = 2\vec{i} - \vec{j} + \vec{k}$

Za druga dva vektora odaberemo lin. nez. vektore koji leže u ravnini (kroz ishodište) okomitoj na pravac s vektorom smjera $2\vec{i} - \vec{j} + \vec{k}$.

Riječ je o ravnini s vektorom normale $2\vec{i} - \vec{j} + \vec{k}$,



tj. o ravnini s jednadžbom $2x - y + z = 0$. Izaberimo npr. vektore $\vec{a_2} = \vec{i} - 2\vec{k}$, $\vec{a_2} = \vec{j} + \vec{k}$.

Zašto baš njih? Zato što kad vektore u ravnini okomitoj na $2\vec{i}-\vec{j}+\vec{k}$ projiciramo na pravac s vektorom smjera $2\vec{i}-\vec{j}+\vec{k}$, onda će se oni preslikati u $\vec{0}$. Stavimo $(a)=\{\vec{a}_1, \vec{a}_2, \vec{a}_3\}$

Vrijedi $P(\vec{a}_1)=\vec{a}_1$, $P(\vec{a}_2)=\vec{0}$, $P(\vec{a}_3)=\vec{0}$

$$P(\vec{a}_1)=1\cdot\vec{a}_1+0\cdot\vec{a}_2+0\cdot\vec{a}_3$$
$$P(\vec{a}_2)=0\cdot\vec{a}_1+0\cdot\vec{a}_2+0\cdot\vec{a}_3$$
$$P(\vec{a}_3)=0\cdot\vec{a}_1+0\cdot\vec{a}_2+0\cdot\vec{a}_3$$

$$[P]_{(a)}=\begin{bmatrix}1&0&0\\0&0&0\\0&0&0\end{bmatrix}$$

$$[P]_{(e)}=[I]_{(e,a)}\cdot[P]_{(a)}\cdot[I]_{(a,e)}$$
$$=\begin{bmatrix}2&1&0\\-1&0&1\\1&-2&1\end{bmatrix}\cdot\begin{bmatrix}1&0&0\\0&0&0\\0&0&0\end{bmatrix}\cdot\begin{bmatrix}2&1&0\\-1&0&1\\1&-2&1\end{bmatrix}^{-1}=\frac{1}{6}\begin{bmatrix}4&-2&2\\-2&1&-1\\2&-1&1\end{bmatrix}$$

$$[P(\vec{v})]_{(e)} = [P]_{(e)} \cdot [\vec{v}]_{(e)}$$

$$= \frac{1}{6}\begin{bmatrix} 4 & -2 & 2 \\ -2 & 1 & -1 \\ 2 & -1 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$= \frac{1}{6}\begin{bmatrix} 4x - 2y + 2z \\ -2x + y - z \\ 2x - y + z \end{bmatrix}$$

$$= \frac{1}{6}\Big((4x-2y+2z)\vec{i} + (-2x+y-z)\vec{j} + (2x-y+z)\vec{k} \Big)$$

U b) dijelu radite slično, samo odaberete vektore $\vec{a}_1 = \vec{i}$, $\vec{a}_2 = \vec{j} - \vec{k}$, $\vec{a}_3 =$ vektor okomit na ravninu razapetu vektorima $\vec{i}$ i $\vec{j} - \vec{k}$.

$z(\vec{a}_1) = \vec{a}_1$, $z(\vec{a}_2) = \vec{a}_2$, $z(\vec{a}_3) = -\vec{a}_3$ $\quad [z]_{(a)} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$

...