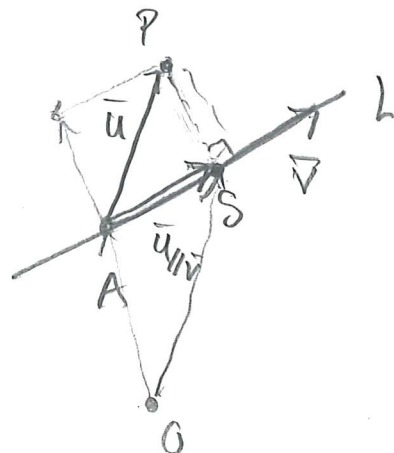


2.8.12

L genom punkten $A = (3, -1, 4)$ riktv. vektor $\vec{v} = e \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix}$ Vilken punkt på L ligger närmast $P: (3, -6, 2)$
Vilket avstånd?

$$\begin{aligned} \vec{u} = \overrightarrow{AP} &= \overrightarrow{OP} - \overrightarrow{OA} = e \begin{pmatrix} 3 \\ -6 \\ 2 \end{pmatrix} - e \begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix} \\ &= e \begin{pmatrix} 0 \\ -5 \\ -2 \end{pmatrix} \end{aligned}$$



$$\vec{u}_{\parallel \vec{v}} = \frac{\vec{u} \cdot \vec{v}}{|\vec{v}|^2} \vec{v} = \frac{\begin{pmatrix} 0 \\ -5 \\ -2 \end{pmatrix} \cdot \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix}}{1^2 + 2^2 + 5^2} e \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix} = \frac{-20}{30} e \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix}$$

$$\vec{OS} = \vec{OA} + \vec{u}_{\parallel \vec{v}} = e \begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix} + \frac{-2}{3} e \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix} = e \begin{pmatrix} 11/3 \\ -7/3 \\ 2/3 \end{pmatrix}$$

$$\text{dvs } S = \left(\frac{11}{3}, \frac{-7}{3}, \frac{2}{3} \right)$$

$$\text{Avst } |\vec{u} - \vec{u}_{\parallel \vec{v}}| = \left| e \begin{pmatrix} 0 \\ -5 \\ -2 \end{pmatrix} - \frac{2}{3} e \begin{pmatrix} -1 \\ 2 \\ 5 \end{pmatrix} \right| =$$

$$\begin{aligned} &= \left| e \begin{pmatrix} -2/3 \\ -11/3 \\ 4/3 \end{pmatrix} \right| = \sqrt{\left(\frac{2}{3}\right)^2 + \left(\frac{11}{3}\right)^2 + \left(\frac{4}{3}\right)^2} = \\ &= \frac{1}{3} \sqrt{2^2 + 11^2 + 4^2} \end{aligned}$$