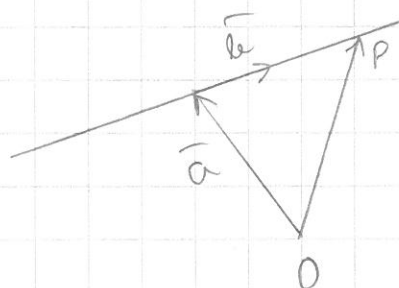


5.8

$$\vec{OP} = \underbrace{3\vec{i} + 4\vec{j} + 2\vec{k}}_{=\vec{a}} + t \underbrace{(\vec{i} + 5\vec{j} - 3\vec{k})}_{=\vec{b} \text{ suoran suuntavektori}}, t \in \mathbb{R}$$

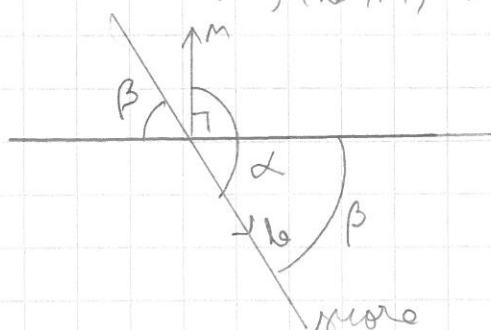


$$\text{Taso: } 3x - 2y + z - 4 = 0$$

$$\vec{n} = 3\vec{i} - 2\vec{j} + \vec{k} \quad (\text{tason normaali-vektori})$$

$$\cos(\vec{b}, \vec{n}) = \frac{\vec{b} \cdot \vec{n}}{|\vec{b}| |\vec{n}|} = \frac{1 \cdot 3 + 5 \cdot (-2) + (-3) \cdot 1}{\sqrt{1^2 + 5^2 + (-3)^2} \sqrt{3^2 + (-2)^2 + 1^2}} = \frac{-10}{\sqrt{35} \sqrt{14}}$$

$$\Rightarrow \angle(\vec{b}, \vec{n}) \approx 116,86^\circ \approx 117^\circ = \alpha$$



Tono

Suoran ja tason välinen kulma:

$$\beta = \alpha - 90^\circ \approx \underline{27^\circ}$$

10. Pisteen etäisyys suorasta

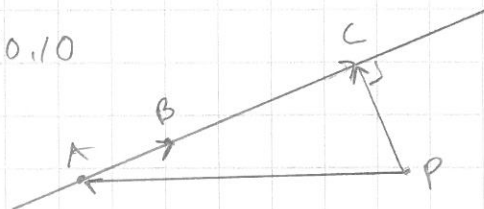


$$\vec{PC} = \vec{PA} + \vec{AC} = \vec{PA} + t\vec{AB}$$

$$\vec{PC} \perp \vec{AB} \quad (\Rightarrow) \vec{PC} \cdot \vec{AB} = 0 \quad (\Rightarrow) t = \dots$$

$$\Rightarrow \vec{PC} = \dots \quad \Rightarrow \begin{cases} |\vec{PC}| = \dots \\ C = (\dots, \dots, \dots) \end{cases}$$

10.10



$$A = (1, -4, 3), B = (-1, -7, 2), P = (-1, 2, 3)$$

$$\begin{aligned} \vec{PC} &= \vec{PA} + \vec{AC} = \vec{PA} + t\vec{AB} \\ &= (2\vec{i} - 6\vec{j}) + t(-2\vec{i} - 3\vec{j} - \vec{k}) \\ &= (2 - 2t)\vec{i} + (-6 - 3t)\vec{j} - t\vec{k} \end{aligned}$$

$$\vec{AB} \perp \vec{PC} \quad (\Rightarrow) \vec{AB} \cdot \vec{PC} = 0$$

$$\Rightarrow -2 \cdot (2 - 2t) + (-3) \cdot (-6 - 3t) + (-1) \cdot (-t) = 0$$

$$\Rightarrow -4 + 4t + 18 + 9t + t = 0$$

$$\Rightarrow 14t + 14 = 0 \quad (\Rightarrow) t = -1$$

$$\Rightarrow \vec{PC} = 4\vec{i} - 3\vec{j} + \vec{k}$$

$$a) C = (-1 + 4, 2 - 3, 3 + 1) = (3, -1, 4)$$

$$b) |\vec{PC}| = \sqrt{4^2 + (-3)^2 + 1^2} = \sqrt{26} \approx \underline{5,10}$$