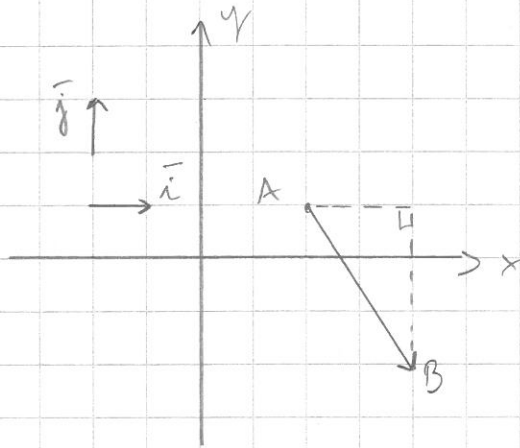


1. Vektorit xyz-koordinaatistossa

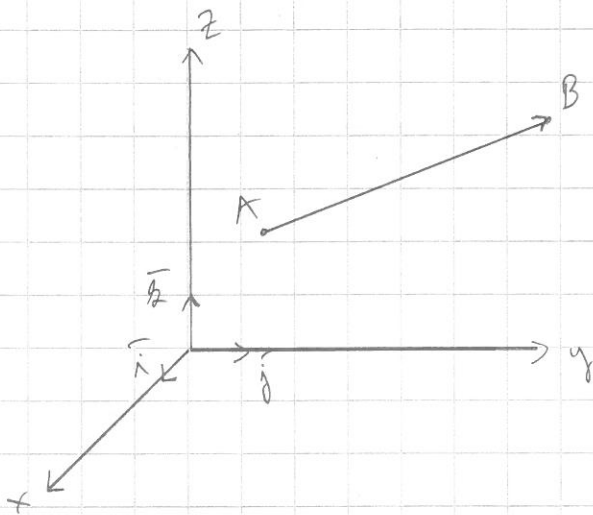
Esim.



$$A = (2, 1) \quad B = (4, -2)$$

$$\begin{aligned} \overline{AB} &= (4-2)\vec{i} + (-2-1)\vec{j} \\ &= 2\vec{i} - 3\vec{j} \end{aligned}$$

$$|\overline{AB}| = \sqrt{2^2 + (-3)^2} = \sqrt{13}$$

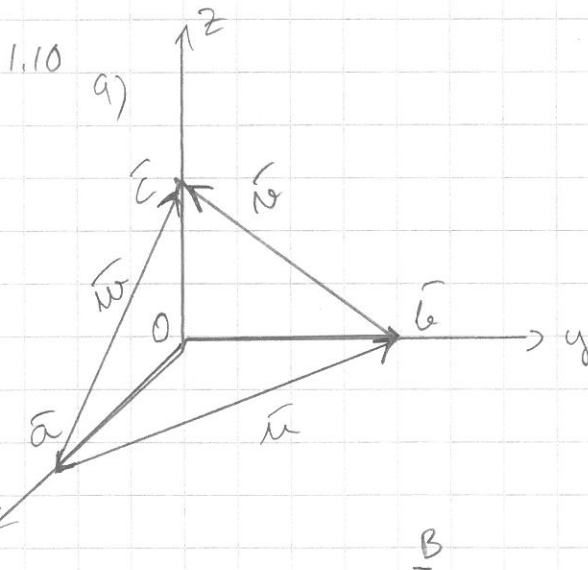


$$A = (x_1, y_1, z_1)$$

$$B = (x_2, y_2, z_2)$$

$$\overline{AB} = (x_2 - x_1)\vec{i} + (y_2 - y_1)\vec{j} + (z_2 - z_1)\vec{k}$$

$$|\overline{AB}| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$



$$\vec{a} = 9\vec{i} \quad \vec{b} = 4\vec{j} \quad \vec{c} = 3\vec{k}$$

b) $\vec{u} = -\vec{a} + \vec{b} = -9\vec{i} + 4\vec{j}$

$$\vec{v} = -\vec{b} + \vec{c} = -4\vec{j} + 3\vec{k}$$

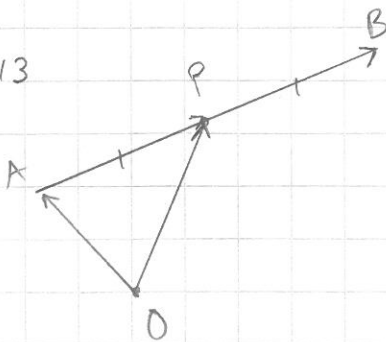
$$\vec{w} = -\vec{a} + \vec{c} = -9\vec{i} + 3\vec{k}$$

c) $|\vec{u}| = \sqrt{(-9)^2 + 4^2} = \sqrt{97}$

$$|\vec{v}| = \sqrt{(-4)^2 + 3^2} = \sqrt{25} = 5$$

$$|\vec{w}| = \sqrt{(-9)^2 + 3^2} = \sqrt{90} = \sqrt{9 \cdot 10} = 3\sqrt{10}$$

1.13



$$A = (-2, 5, -8) \quad B = (-2, -7, 4)$$

$$\overline{OP} = \overline{OA} + \overline{AP} = \overline{OA} + \frac{1}{2}\overline{AB}$$

$$= (-2\vec{i} + 5\vec{j} - 8\vec{k}) + \frac{1}{2}(-12\vec{j} + 12\vec{k})$$

$$= -2\vec{i} - \vec{j} - 2\vec{k}$$

$$|\overline{OP}| = \sqrt{(-2)^2 + (-1)^2 + (-2)^2} = \sqrt{9} = 3$$

P:n etäisyys origosta: $|\overline{OP}| = 3$