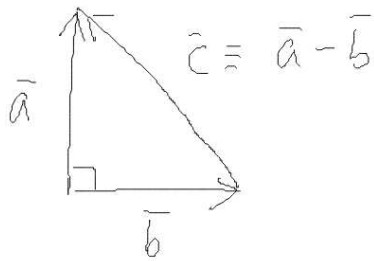


$$\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \angle(\vec{a}, \vec{b})$$

$$\vec{a} \cdot \vec{a} = |\vec{a}|^2 = \vec{a}^2$$

972.



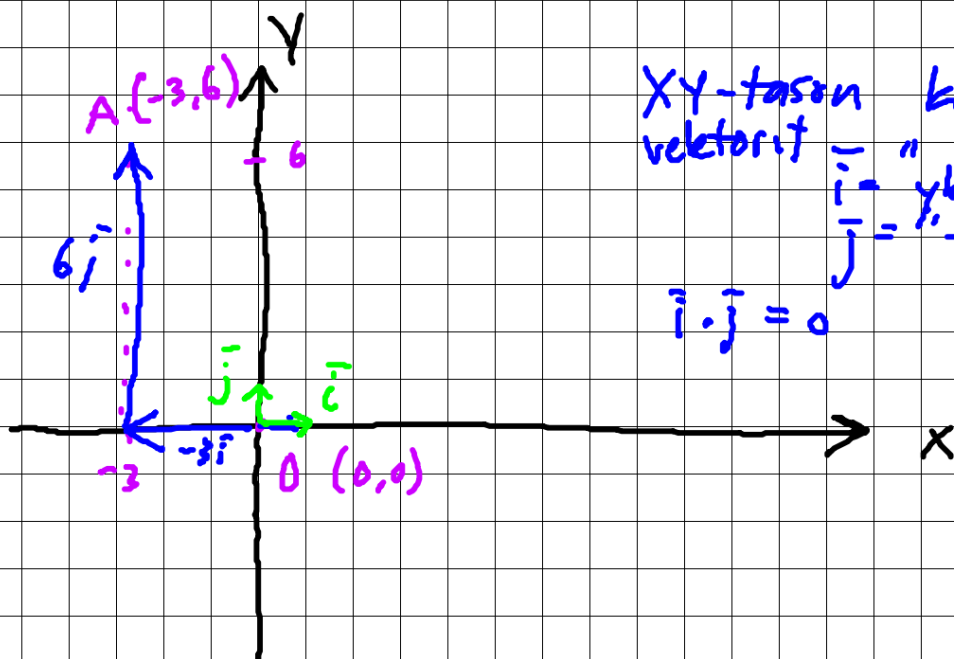
$$c^2 \equiv a^2 + b^2$$

$$\vec{c}^2 = \vec{c} \cdot \vec{c} = (\vec{a} - \vec{b}) \cdot (\vec{a} - \vec{b}) = \vec{a}^2 - 2\vec{a} \cdot \vec{b} + \vec{b}^2$$

$= 0$  koska suorak. kolmio

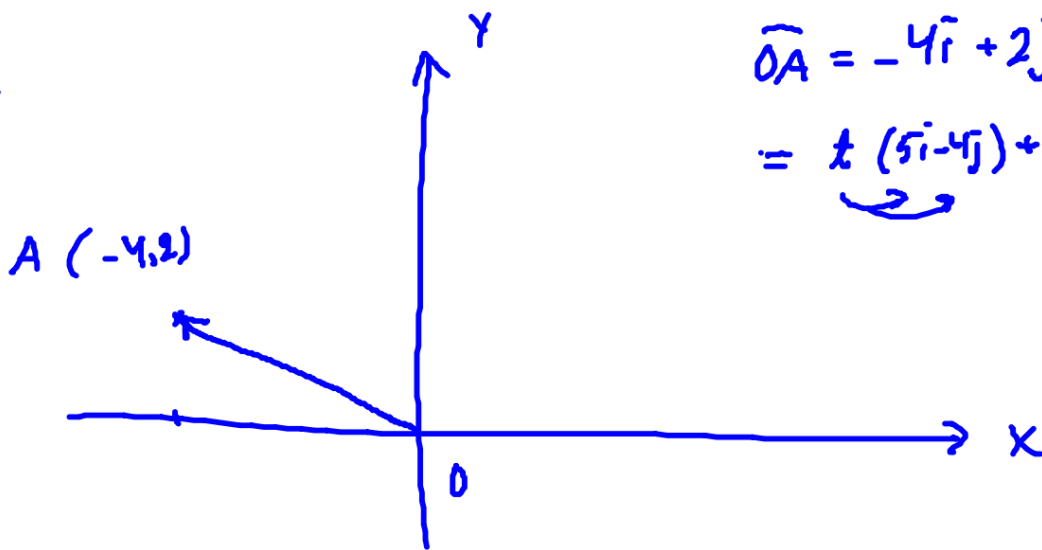
$$= \vec{a}^2 + \vec{b}^2$$

# Vektorit XY-koordinaatistossa



$\vec{OA} = A$ :n paikkavektori =  $-3\vec{i} + 6\vec{j}$   
piste  $A = (-3, 6)$

309.



$$\begin{aligned}\overline{OA} &= -4\bar{i} + 2\bar{j} \\ &= \underbrace{t(5\bar{i} - 4\bar{j})} + \underbrace{s(-4\bar{i} + 3\bar{j})}\end{aligned}$$

$$-4\bar{i} + 2\bar{j} = \underline{5t\bar{i}} - 4t\bar{j} - \underline{4s\bar{i}} + 3s\bar{j}$$

$$-4\bar{i} + 2\bar{j} = \bar{i}(5t - 4s) + \bar{j}(-4t + 3s)$$

$\bar{i}$ :n kerroimet

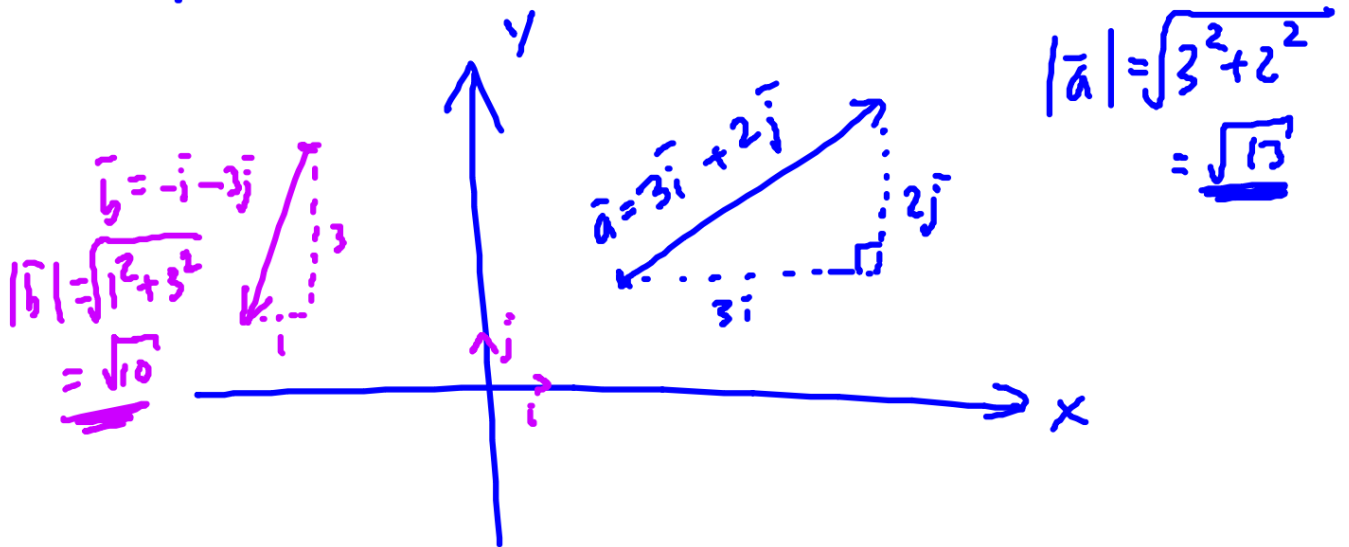
$\bar{j}$ :n -t-

$$\begin{cases} -4 = 5t - 4s & \rightarrow t = 4, s = 6 \\ 2 = -4t + 3s & \end{cases}$$

$$v: -4\bar{i} + 2\bar{j} = 4(5\bar{i} - 4\bar{j}) + 6(\dots)$$

## Vektorin pituus

$$|\vec{a}| = \vec{a}:n \text{ pituus}$$

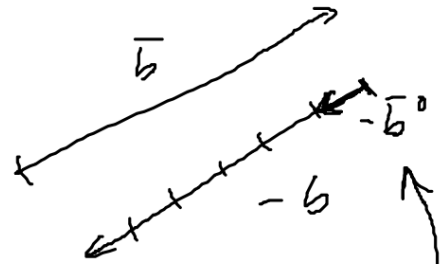


Eli:

$$\vec{a} = x\vec{i} + y\vec{j} \rightarrow |\vec{a}| = \sqrt{x^2 + y^2}$$

$$322. \quad a) \quad \bar{b} = 4\sqrt{2}i - 2j$$

$$-\bar{b} = -4\sqrt{2}i + 2j$$



$$\bar{a}^0 = \frac{\bar{a}}{|\bar{a}|}$$

$$|-\bar{b}| = \sqrt{(-4\sqrt{2})^2 + 2^2}$$
$$= \sqrt{16 \cdot 2 + 4} = \sqrt{36} = 6$$

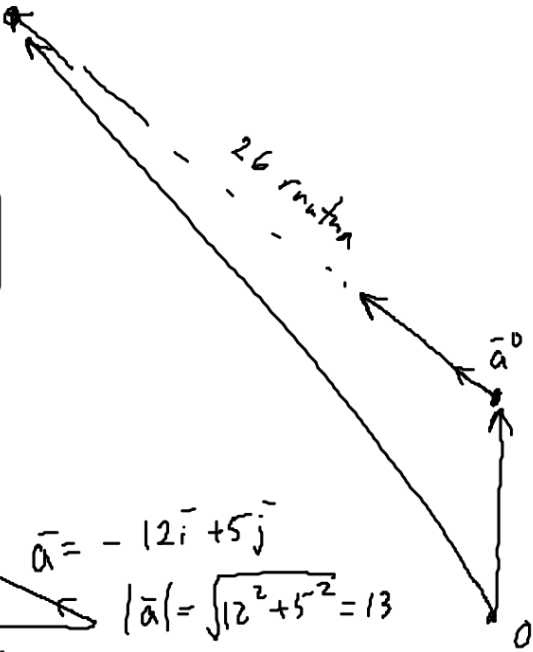
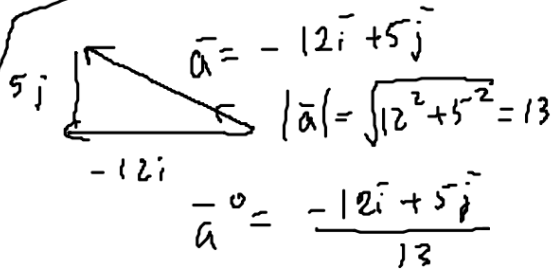
$$\bar{b}^0 = \frac{-\bar{b}}{6} = \frac{-4\sqrt{2}i + 2j}{6} = -\frac{2\sqrt{2}i + j}{3}$$

323.

$\swarrow$  x-koord.     $\searrow$  y-koord.  
 $B = -4\bar{i} + 0\bar{j}$

V:  $B = (-4, 0)$

(s. 82)  
 s. 61:  
 301, 303, 305  
 307 (esim. 4)  
 310  
 s. 66:  
 315, 317  
 319



$A (20, -10) \Rightarrow \bar{OA} = 20\bar{i} - 10\bar{j}$

$$\begin{aligned} \bar{OB} &= \bar{OA} + 26 \bar{a}^0 (-12\bar{i} + 5\bar{j}) \\ &= 20\bar{i} - 10\bar{j} + 26 \cdot \frac{-12\bar{i} + 5\bar{j}}{13} \\ &= 20\bar{i} - 10\bar{j} - 24\bar{i} + 10\bar{j} \\ &= -4\bar{i} \end{aligned}$$