

$$y = kx + b \quad k$$

$$ax + by + c = 0$$

$$by = -ax - c \quad | : b (\neq 0)$$

$$y = \boxed{\frac{-a}{b}}x - \frac{c}{b}$$

$$k = \frac{-a}{b}$$

$$(x_0, y_0)$$

$$y - y_0 = k(x - x_0)$$

$$(x_1, y_1)$$

$$k = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_0}{x_1 - x_0}$$

## Pisteen etäisyys suorasta

Onn laske pisteen  $A(-3, 2)$  etäisyys suorasta  $y = -\frac{3}{4}x + 1$ .

Ratk. 1) piirrä kuva

$$2) \quad d = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$

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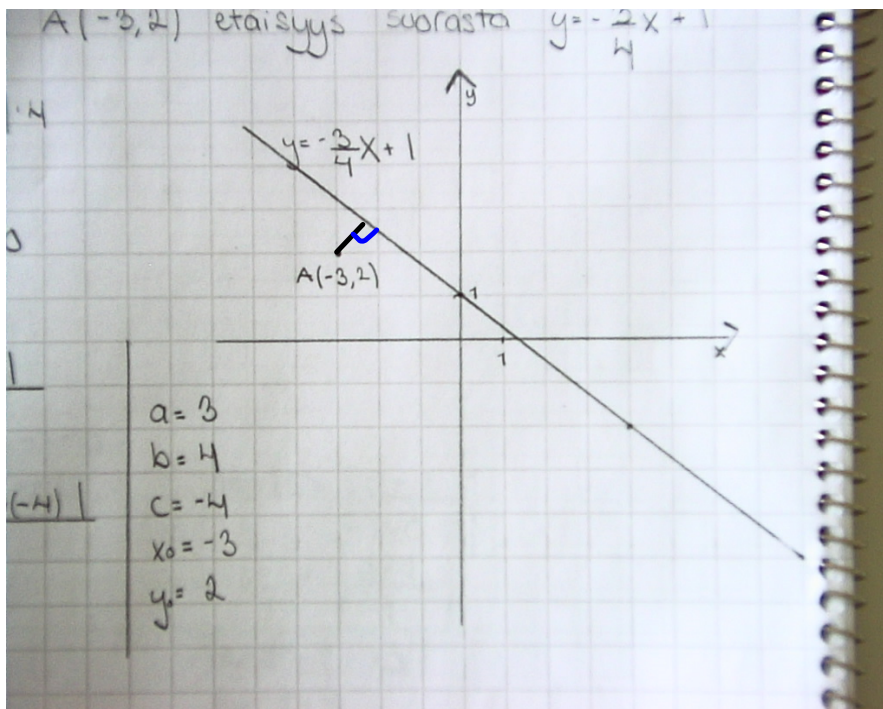
$$y = -\frac{3}{4}x + 1 \quad | \cdot 4$$

$$3x + 4y - 4 = 0$$

$$d = \frac{|3(-3) + 4 \cdot 2 - 4|}{\sqrt{3^2 + 4^2}}$$

$$\begin{array}{l} a = 3 \\ b = 4 \\ c = -4 \\ x_0 = -3 \\ y_0 = 2 \end{array}$$

$$\underline{\underline{d}} = \frac{|-5|}{\sqrt{25}} = \frac{5}{5} = \underline{\underline{1}}$$



;

$$k_1 \cdot k_2 = -1$$

$$-\frac{3}{4} \cdot k_2 = -1 \quad | : (-\frac{3}{4})$$

$$k_2 = \frac{-1}{-\frac{3}{4}}$$

$$= -1 \cdot (-\frac{4}{3})$$

$$\begin{matrix} (x_0, y_0) & k_2 = \frac{4}{3} \\ (-3, 2) & \end{matrix}$$

rumus m:

$$y - y_0 = k(x - x_0)$$

$$y - 2 = \frac{4}{3}(x - (-3))$$

$$y = \frac{4}{3}x + 6$$

C:

$$\begin{cases} y = -\frac{3}{4}x + 1 \\ y = \frac{4}{3}x + 6 \end{cases}$$

Sij. keino

$$-\frac{3}{4}x + 1 = \frac{4}{3}x + 6 \quad | \cdot 12$$

$$-9x + 12 = 16x + 72$$

$$-9x - 16x = 72 - 12$$

$$-25x = 60 \quad | : (-25)$$

$$x = \frac{-60}{25}$$

$$x = -\frac{12}{5}$$

$$y = -\frac{3}{4} \cdot (-\frac{12}{5}) + 1$$

$$= \frac{36}{20} + 1 = 1\frac{16}{20} + 1$$

$$= \frac{14}{5} = 1\frac{4}{5} + 1$$

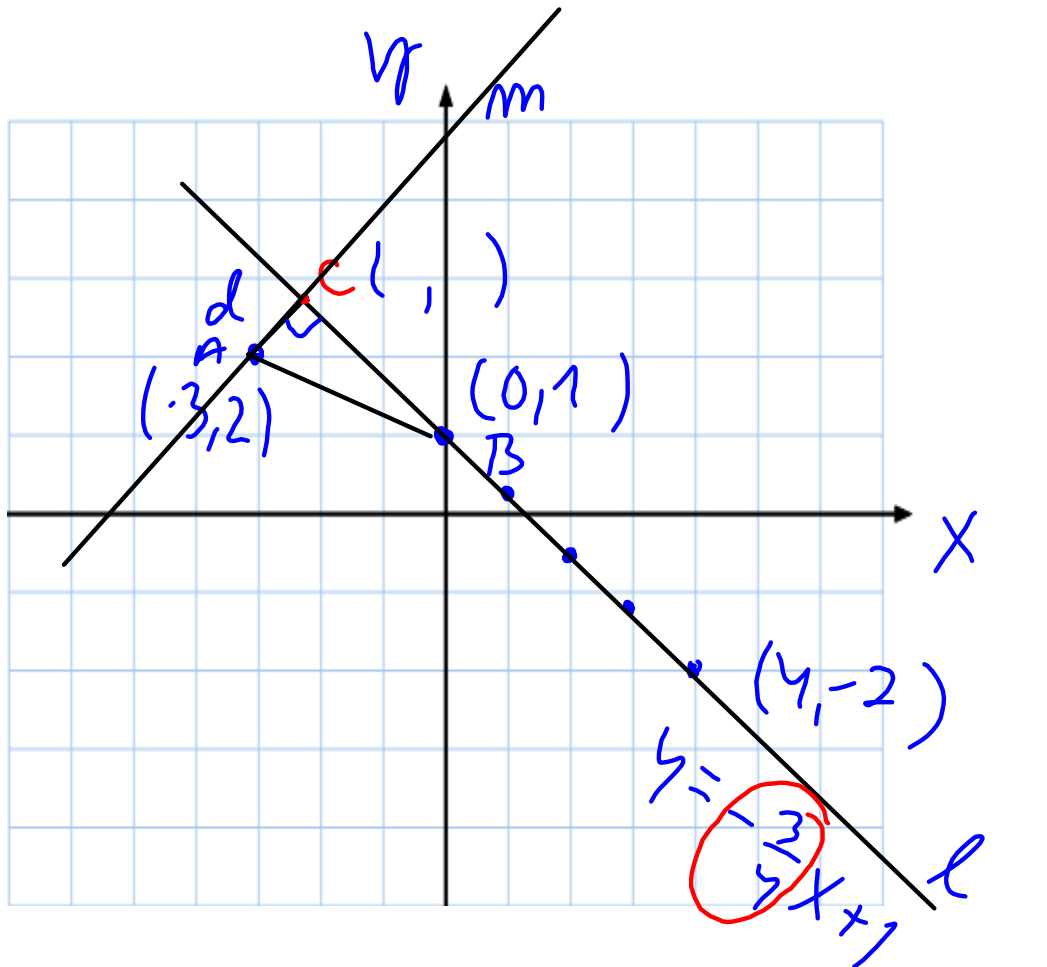
$$= 2\frac{4}{5}$$

$$C: \begin{pmatrix} (x_2, y_2) \\ (-\frac{12}{5}, 2\frac{4}{5}) \end{pmatrix} \begin{pmatrix} (x_1, y_1) \\ (-3, 2) \end{pmatrix}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-\frac{12}{5} - (-3))^2 + (2\frac{4}{5} - 2)^2}$$

$$d = 1$$



$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

(S. 57)

II type  $(x_0, y_0)$

$$ax + by + c = 0$$

$$(a \neq 0 \text{ ja } b \neq 0)$$

$$d = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$

$$y = -\frac{3}{4}x + 1$$

$$\frac{3}{4}x + y - 1 = 0 \quad | \cdot 4$$

$$3x + 4y - 4 = 0$$

$$(x_0, y_0) \\ (-3, 2)$$

$$a = 3 \\ b = 4 \\ c = -4$$

$$d = \frac{|3 \cdot (-3) + 4 \cdot 2 - 4|}{\sqrt{3^2 + 4^2}}$$

$$= \frac{|-5|}{\sqrt{25}} = \frac{5}{5} = \underline{\underline{1}}$$

esim laske pisteen  $(3, -2)$

etäisyys suorasta

$$y = \frac{12}{5}x - \frac{7}{5}$$

Ratk.

$$y = \frac{12}{5}x - \frac{7}{5} \quad | \cdot 5$$

$$12x - 5y - 7 = 0$$

$$(x_0, y_0) = (3, -2)$$

$$a = 12$$

$$b = -5$$

$$c = -7$$

$$d = \frac{|\underline{ax_0} + \underline{by_0} + \underline{c}|}{\sqrt{a^2 + b^2}}$$

$$= \frac{|12 \cdot 3 - 5 \cdot (-2) - 7|}{\sqrt{12^2 + (-5)^2}} = \frac{|39|}{13} = \frac{39}{13}$$

$$d = 3$$

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$$2ax - y + 6a + 2 = 0$$

$(x, y)$   
 $(1, -1)$

$$2a \cdot 1 - (-1) + 6a + 2 = 0$$

$$8a + 3 = 0$$

$$8a = -3$$

$$a = -\frac{3}{8}$$

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yht.