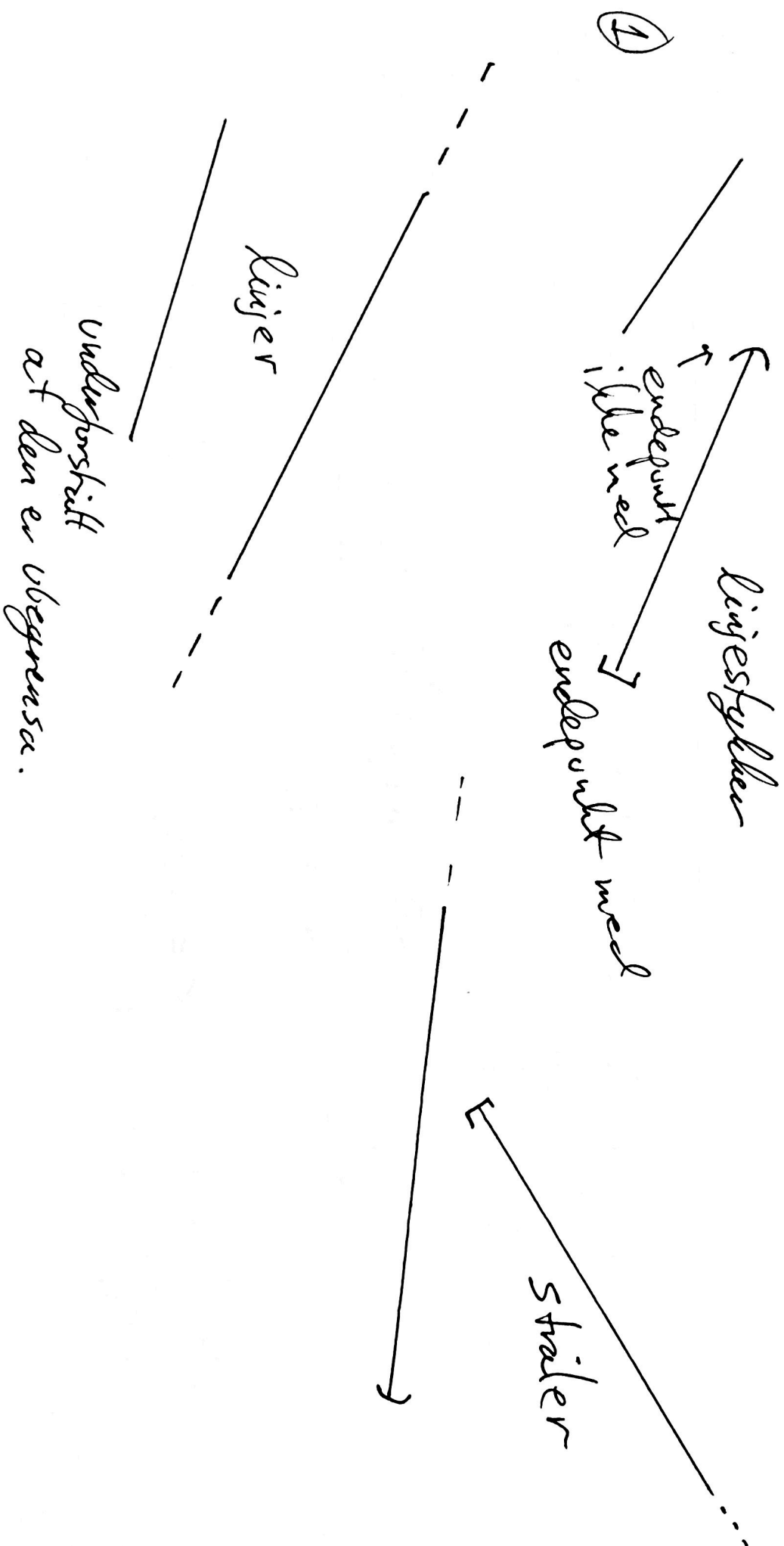
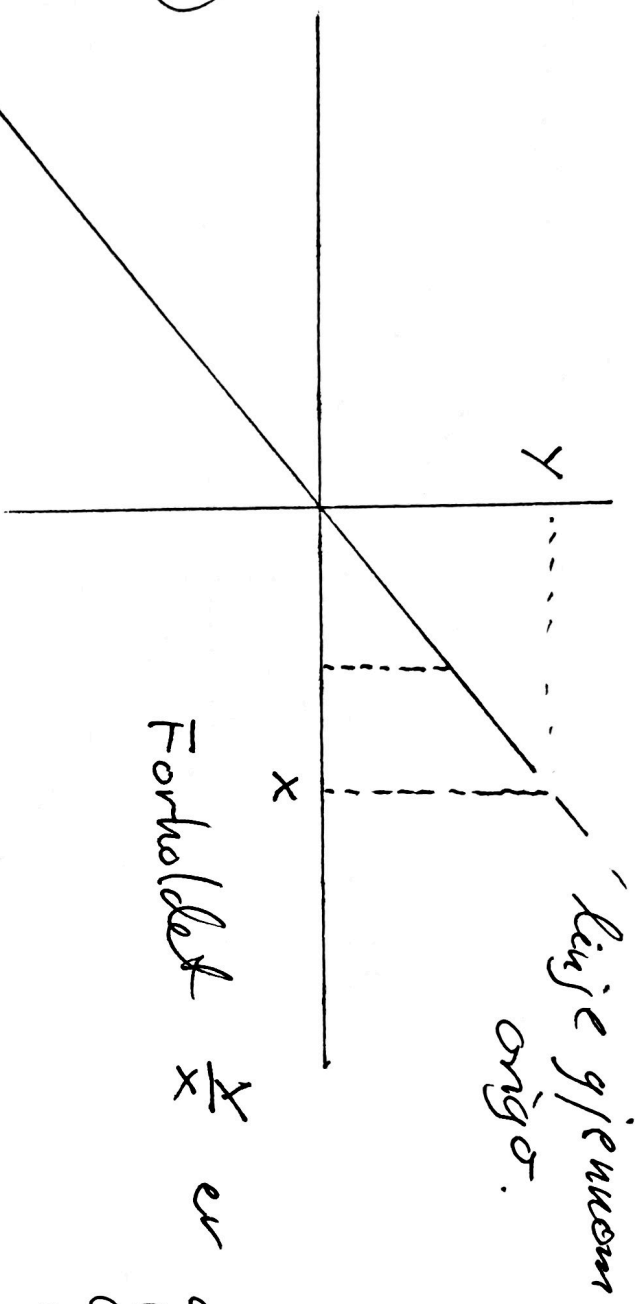


Kap 4 Linjer og funktioner.





②

Forholdet $\frac{y}{x}$ er det samme for alle $x \neq 0$ (x, y) på linje

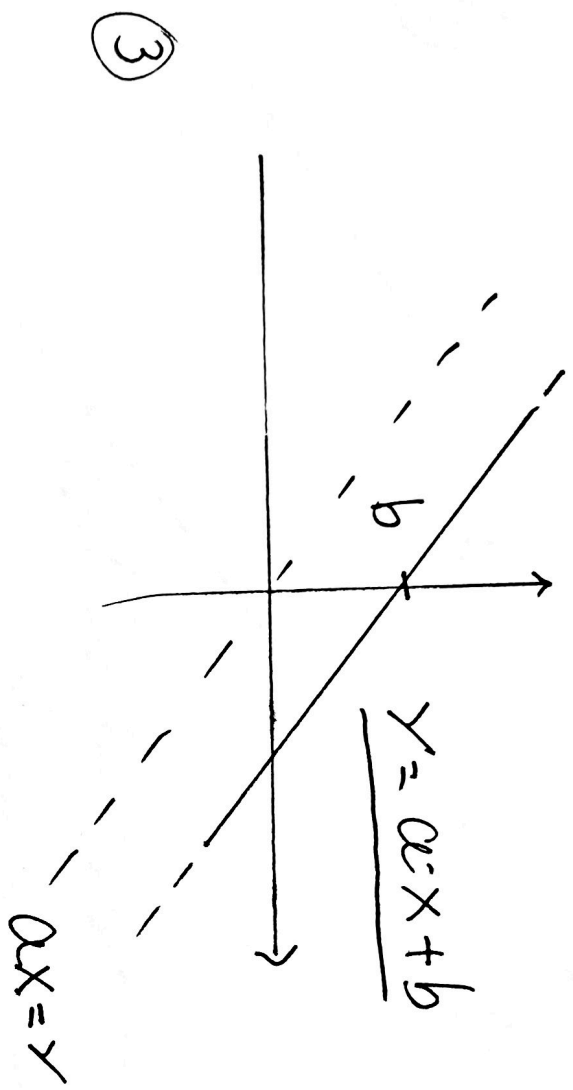
Stigningsfaktoren til linjen a

$$a = \frac{y}{x} \quad x \neq 0$$

$a > 0$ / stige
 $a = 0$ — horisontal
 $a < 0$ / synke

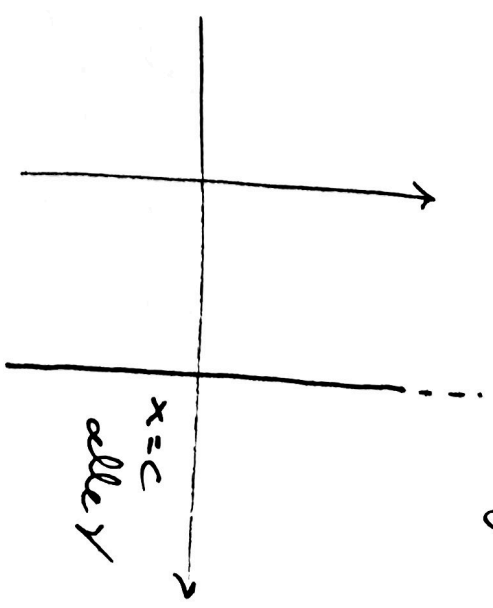
$a \cdot x = y$ for alle x .
 (x, y) på linje a .

Forskriften ligger langs x -aksen med b



med b

Vertikale linjer



problemer (c, y)

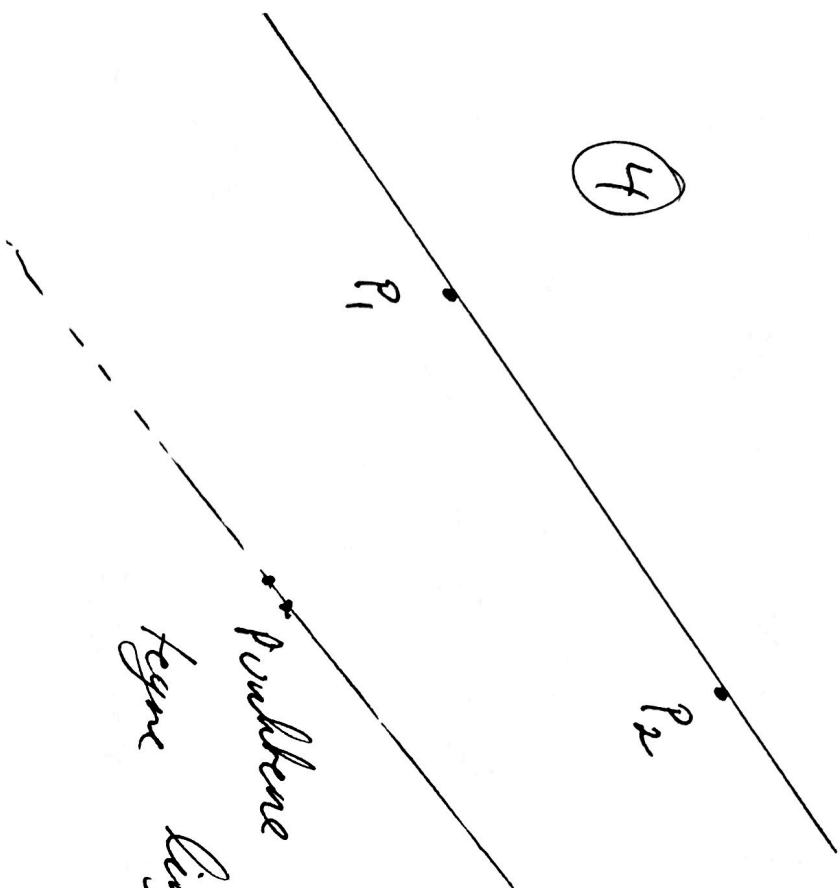
$y \in \mathbb{R}$

Vertikale
linjer
er løsningene til
likningene $x = c$

(Ligger her
til x)

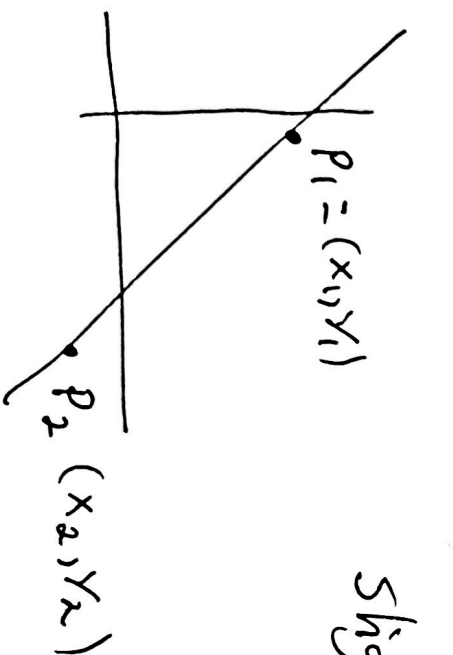
④

Det går altså en
linje gennem to forskellige punkter



Punkterne nær, gir usikkerhed når vi skal
tegne linjen mellem punkterne.

4.3



Signingsstillet

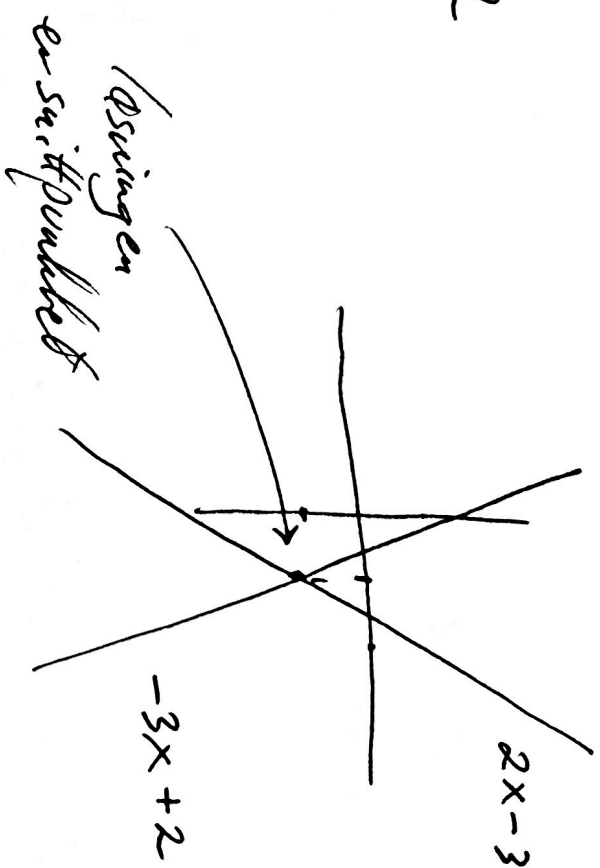
$$a = \frac{y_2 - y_1}{x_2 - x_1}$$

$$2x-3 = y = -3x+2$$

$$2x - (-3x) = 2 - (-3)$$

$$5x = 5 \quad \left(\frac{1}{5}\right)$$

$$x = 1$$



⑤

$$2x-3 \geq -3x+2$$

Bestimme x für
 die $y = 2x-3$
 liegen oberhalb der
 Linie $y = -3x+2$.
 Lösung $x \in [1, \infty)$

Finnd skningskallet til linjerne

$$y = ax + b$$

skningskallet a

1) $y = 3x + 1$

2) $y = -2x + 1 - x + 2$

3) $2y + 3y + 4 = 0$

⑥ 4) $y + 2 + x = y - 4$

skningskallet er $a = -3$.

1) $a = 3$.

2) $y = -3x + 3$

$y = -\frac{4}{5} \left(= 0 \cdot x - \frac{4}{5} \right)$

skningskallet er $a = 0$ horizontal linje

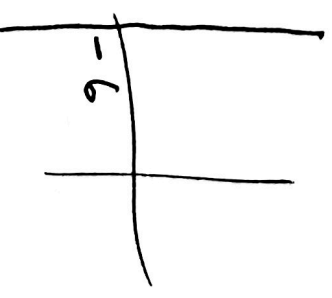
3) $5y = -4$

4) $y - y + x + 2 + 4 = 0$

$\Leftrightarrow x + 6 = 0$

$\Leftrightarrow x = -6$ vertikl linje

her ille skningskallet.



$$2x + 3y = 4$$

$$3y = 4 - 2x \quad | \cdot \frac{1}{3}$$

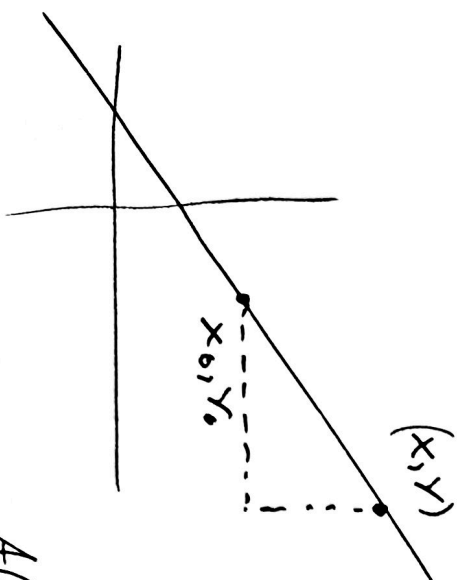
$$y = \frac{4}{3} - \frac{2}{3}x$$

⑦

Stigningskoeff. $= -\frac{2}{3}$.
 finder y -aksen: $y = \frac{4}{3}$

4.5

Etpunktsformlen



Linjen gennem $P_0(x_0, y_0)$ og
 stigningskoeff. a er givet ved

$$y = a(x - x_0) + y_0$$

$$\frac{y - y_0}{x - x_0} = a \quad \text{sam med } (x, y) \text{ og } (x_0, y_0) \text{ giver etpunktsformlen}$$

Alternativt

at

$$y = ax + b \quad b \text{ må være slik}$$

$$y_0 = ax_0 + b \quad ; \quad b = y_0 - ax_0$$

$$\text{Giver } y = ax + y_0 - ax_0 = a(x - x_0) + y_0$$

Finn likningen til linjen gjennom $(3, 2)$
med skjæringshell -4 .

$$\textcircled{8} \quad y = -4(x-3) + 2 = \underline{-4x + 14}$$

Oppg. Finn likningen til linjen gjennom $P_0(-3, -4)$
og skjæringshell $a = -2$.

$$\begin{aligned} y &= -2(x - (-3)) + (-4) \\ &= -2x - 6 - 4 \\ y &= -2x - 10 \quad \checkmark \end{aligned}$$

~~Oppg~~

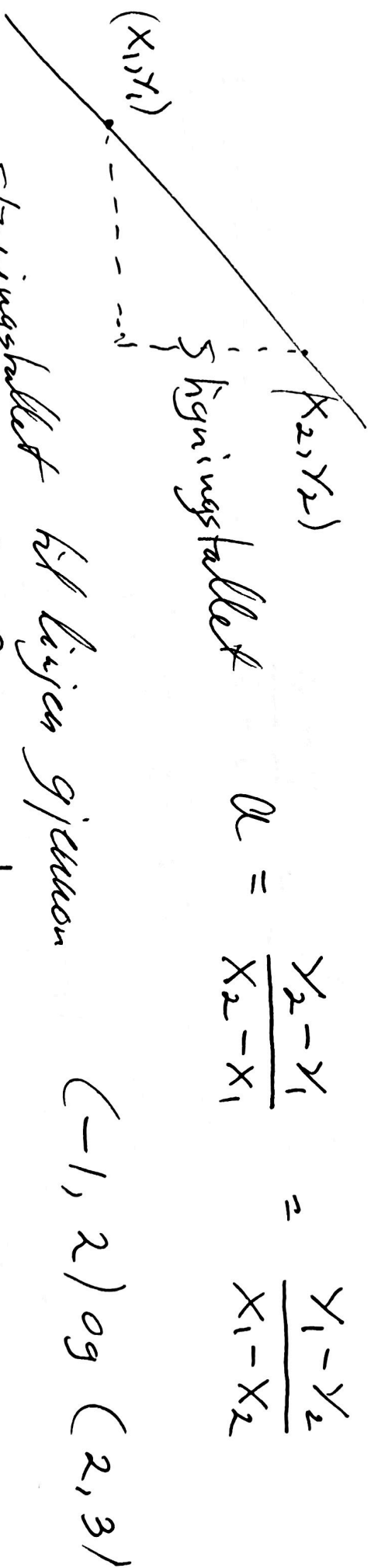
$$\begin{aligned} P_0(-2, 3) \quad a &= -5 \\ y &= -5(x - (-2)) + 3 = -5x + (-5)(-1)(-2) + 3 \end{aligned}$$

$$\underline{y = -5x - 7}$$

$$P_0(2, -3) \quad a = 1$$

$$Y = 1(X - 2) + (-3) = X - 2 - 3$$

$$\textcircled{9} \quad \underline{Y = X - 5}$$



$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$$

Skjningsstøttet til lignen gjennom

$$\text{er } \frac{3 - 2}{2 - (-1)} = \underline{\underline{\frac{1}{3}}}$$

$(-1, 2)$ og $(2, 3)$

En ligning for lignen gjennom punktene er:

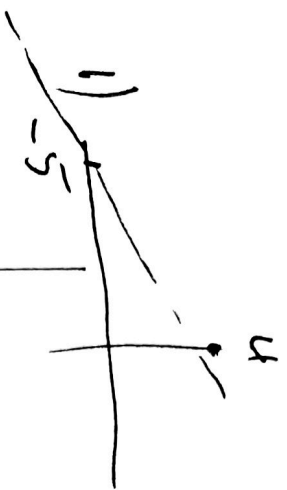
$$Y = \frac{1}{3}(X - (-1)) + 2 = \frac{X}{3} + \frac{1}{3} + 2$$

$$\underline{Y = \frac{1}{3}(X + 7)}$$

~~opgave~~
 Finn skningsball
 og ligning for linjene
 gjennom

(10)

- | | | | |
|----|--------------------|----|---------------------|
| 1) | $(0, 4)$ | og | $(-5, 0)$ |
| 2) | $(3, -4)$ | og | $(3, 7)$ |
| 3) | $(\frac{1}{3}, 2)$ | og | $(-1, \frac{1}{2})$ |



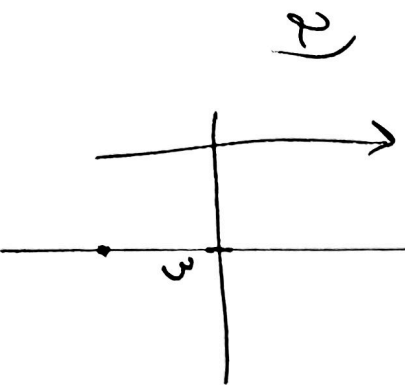
$$a = \frac{0 - 4}{-5 - 0} = \frac{-4}{-5} = \frac{4}{5}$$

$$y = \frac{4}{5}(x - 0) + 4 = \frac{4}{5}x + 4$$

$$a = \frac{x_2 - x_1}{x_2 - x_1} = \frac{7 - (-4)}{3 - 3}$$

ikke
defineret

Linjen har ikke skningsball — vertikal.
 $x = 3$ ligning for linjen.



$$3) a = \frac{x_1 - x_2}{x_1 - x_2} = \frac{2 - 1/2}{1/3 - (-1)} = \frac{3/2}{4/3} \cdot \frac{6}{6}$$

$$a = \frac{3 \cdot 3}{4 \cdot 2} = \frac{9}{8}$$

⑪

$$y = \frac{9}{8} \left(x - \frac{1}{3} \right) + 2$$

$$= \frac{9}{8} x - \frac{3 \cdot 3}{8 \cdot 3} + \frac{2 \cdot 8}{8}$$

$$= \frac{9}{8} x - \frac{3}{8} + \frac{16}{8}$$

$$y = \frac{9}{8} + \frac{13}{8}$$

$$1 \text{ m/s} = 3.6 \text{ km/t}$$

$$1 \text{ km} = 1000 \text{ m}$$

$$1 \text{ t} = 60 \text{ min} = 60 \cdot 60 \text{ sek} \\ = 3600 \text{ sek}$$

(12)

$$1 \text{ km/t} = \frac{1000 \text{ m}}{3600 \text{ sek}} = \frac{1}{3.6} \text{ m/sek} \quad | \cdot 3.6$$

$$\text{Så } \underline{1 \text{ m/s} = 3.6 \text{ km/t}}$$

opp

$$V = 1 \text{ m/s}$$

Hvor lang tid brukes for å gå 1 km?

$$V \cdot t = s$$

$$t = \frac{s}{V}$$

$$= \frac{1}{3.6}$$

$$\cdot 60 \text{ min} =$$

$$\frac{60}{3.6} \text{ min} =$$

$$\frac{10}{3} \text{ min} = \frac{50}{3} \text{ min}$$

$$= 16 \text{ min} + \frac{2}{3} \text{ min} = 16 \text{ min} + \frac{2}{3} \cdot 60 \text{ sek} = 16 \text{ min} \\ + \underline{\underline{40 \text{ sek}}}$$

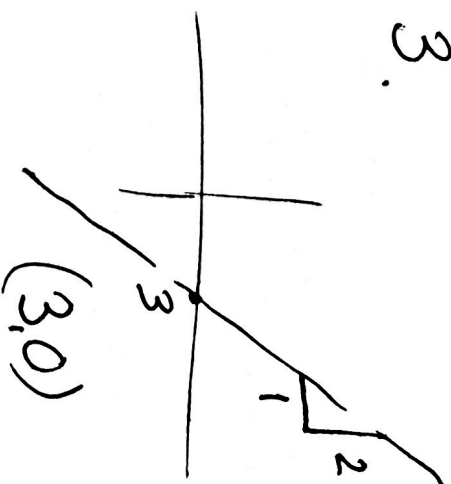
oppg.

Finne likningen til linjen m. skjningspunkt 2

Som har utspunkt i $X = 3$.

13

$$Y = ax + b$$



$$Y = a(X - X_0) + Y_0$$

$$2(X - 3) + 0 = \underline{2X - 6}$$

Likning for linjen gitt

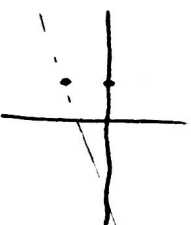
$$(-1, -2) \text{ og } (-4, -3)$$

oppg.

$$a = \frac{-3 - (-2)}{-4 - (-1)} = \frac{-1}{-3} = \frac{1}{3}$$

$$Y = \frac{1}{3}(X - (-1)) + (-2)$$

$$Y = \frac{X}{3} - \frac{5}{3}$$



$$(-2 = \frac{-2}{1} \cdot \frac{3}{3} = \frac{-6}{3})$$

$$a = \frac{X_2 - X_1}{X_2 - X_1}$$

$$(X_1, Y_1)$$

4.66

$$f(x) = -3x + 2$$

(14)

$$b) f(x) = -x^2 + 2x + 3$$

$$= -(x^2 - 2x - 3)$$

$$= -(x-1)^2 - 1 + 3$$

$$= \underline{\underline{-(x-1)^2 + 4}}$$

a)

$$\text{Regn ut } f(-2) = -3(-2) + 2 = \underline{\underline{8}}$$

$$f(0) = 2$$

$$f(2) = -3 \cdot 2 + 2 = \underline{\underline{-4}}$$

$$f(-2) = -(-2)^2 + 2(-2) + 3$$

$$= -(4) + 2(-2) + 3$$

$$= -4 - 4 + 3 = -5$$

$$f(0) = 3$$

$$f(2) = -(2)^2 + 2(2) + 3$$

$$= -4 + 4 + 3 = \underline{\underline{3}}$$