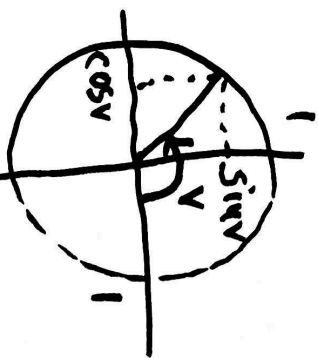
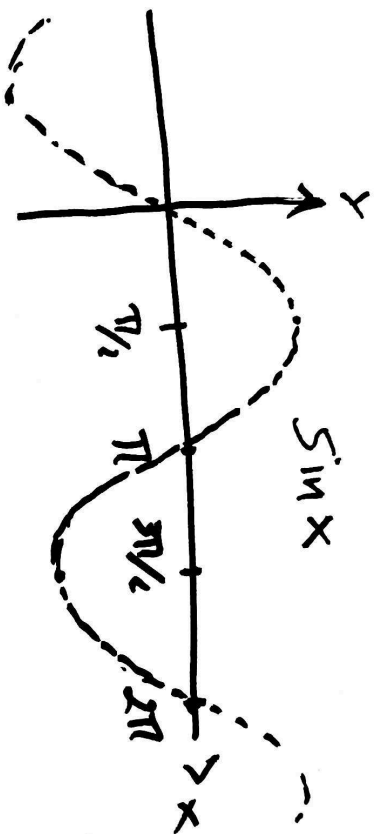


28 feb
26

11 D Trigonometriske funktioner



enheds cirkel



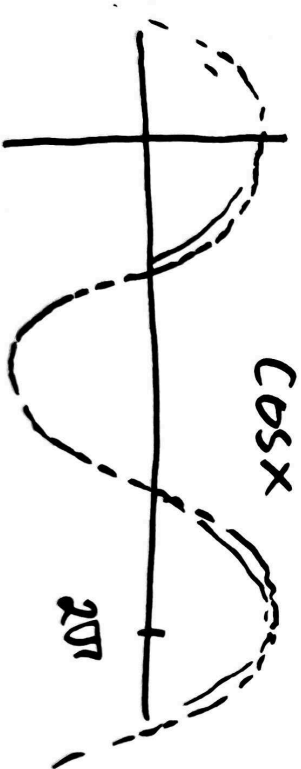
Begynder
vinkelværd
radianer
($\pi \text{ rad} = 180^\circ$)

$$\cos x = \sin\left(\frac{\pi}{2} - x\right)$$

$$\cos x = \cos(-x) = \sin\left(\frac{\pi}{2} + x\right)$$

Grafen til $\cos x$ er lig grafen til $\sin x$ forskudt
til venstre med $\pi/2$.

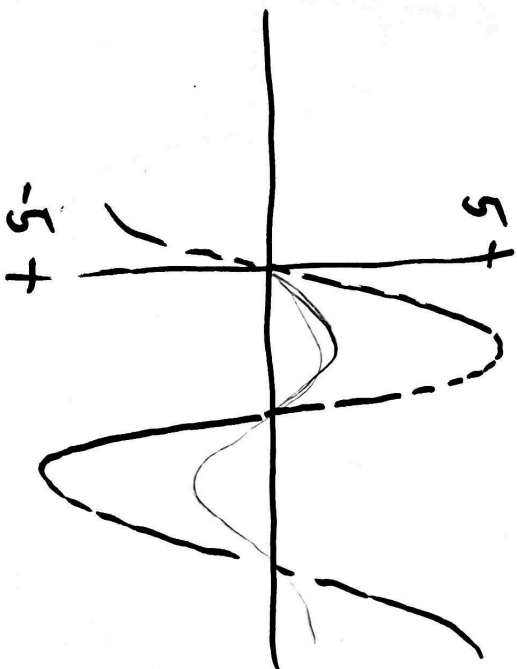
Definitionsmængde : \mathbb{R}
Værdimængde : $[-1, 1]$



Eksempler. $f(x) = 5 \cdot \sin x$

$$V_f = [-5, 5]$$

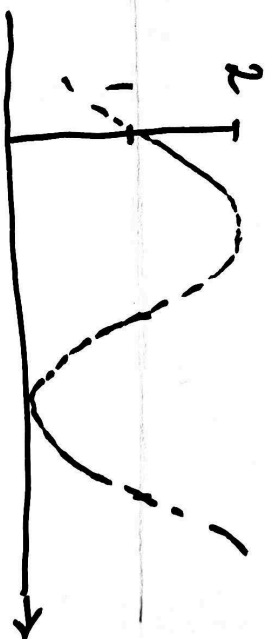
Skellen grafen til $\sin x$
i x -retning med 5



$$g(x) = \sin(x) + 1$$

$$V_g = [0, 2]$$

Forskyver grafen
i y -retning.



$$h(x) = \sin(cx)$$

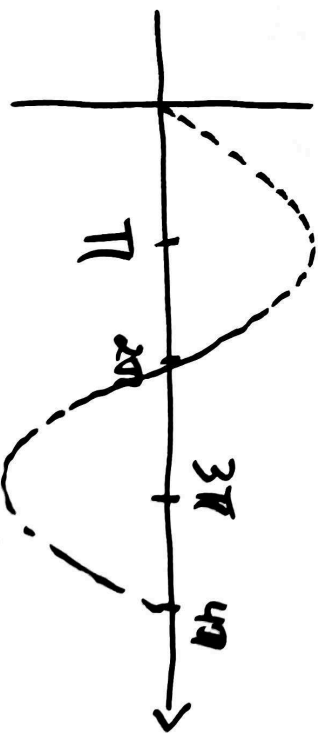
$$cx = 2\pi$$

$$x = 2\pi/c$$

$$c = 1/2$$

Periode
 4π

Periode $2\pi/|c|$

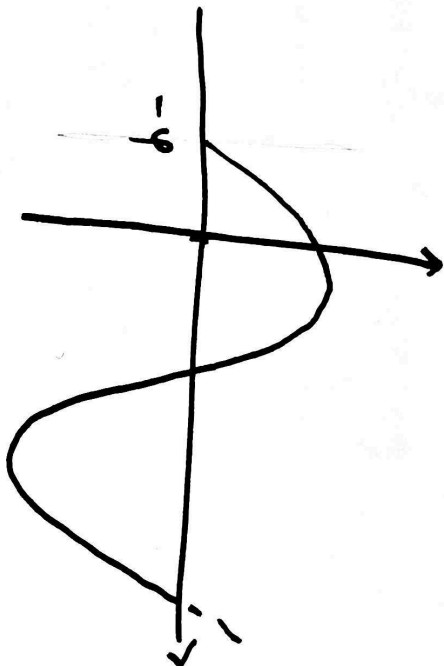


Skellen grafen i x -retning med $|c|$
og skellen i y -retning med $c < 0$

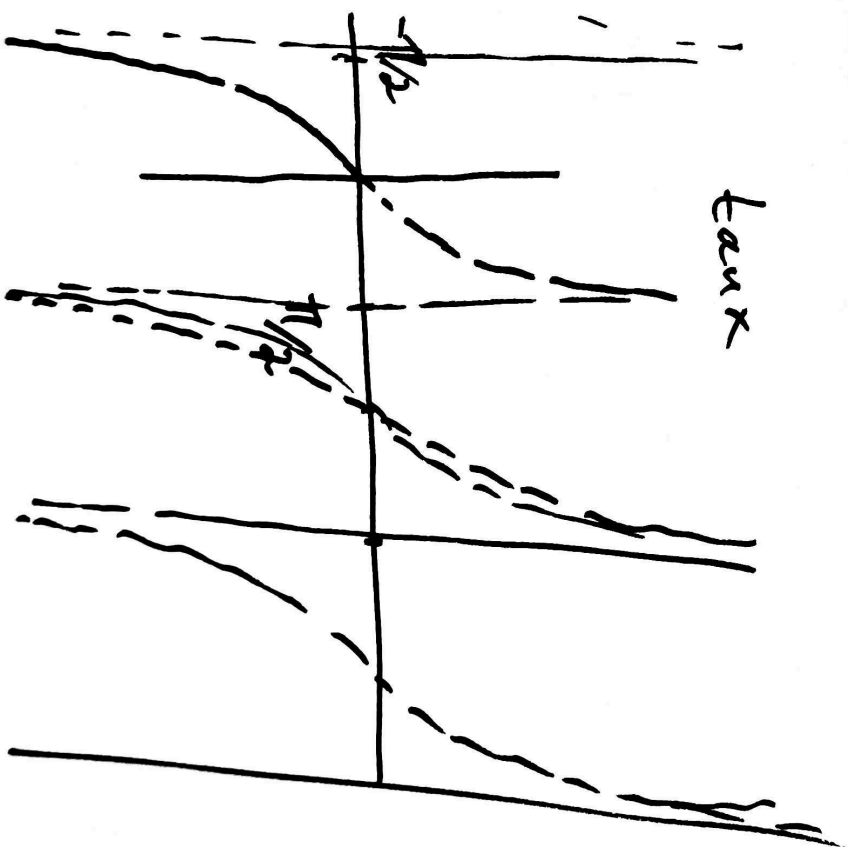
$\sin(x+\varphi)$

Grafen er lik
grafen til $\sin x$
forskyvde med
 φ mot venstre

($|\varphi|$ mot høyre)
hvis $\varphi < 0$)



Grafen til $\tan x$



Harmonisk svingning (sinus funksjoner)

$$f(x) = A \sin(cx + \varphi) + d$$

$d = 0$ jomvelslinjen
(horisontal linje)

$|A|$ amplituden

Perioden: $P = \frac{2\pi}{c}$

φ faseforskyvning

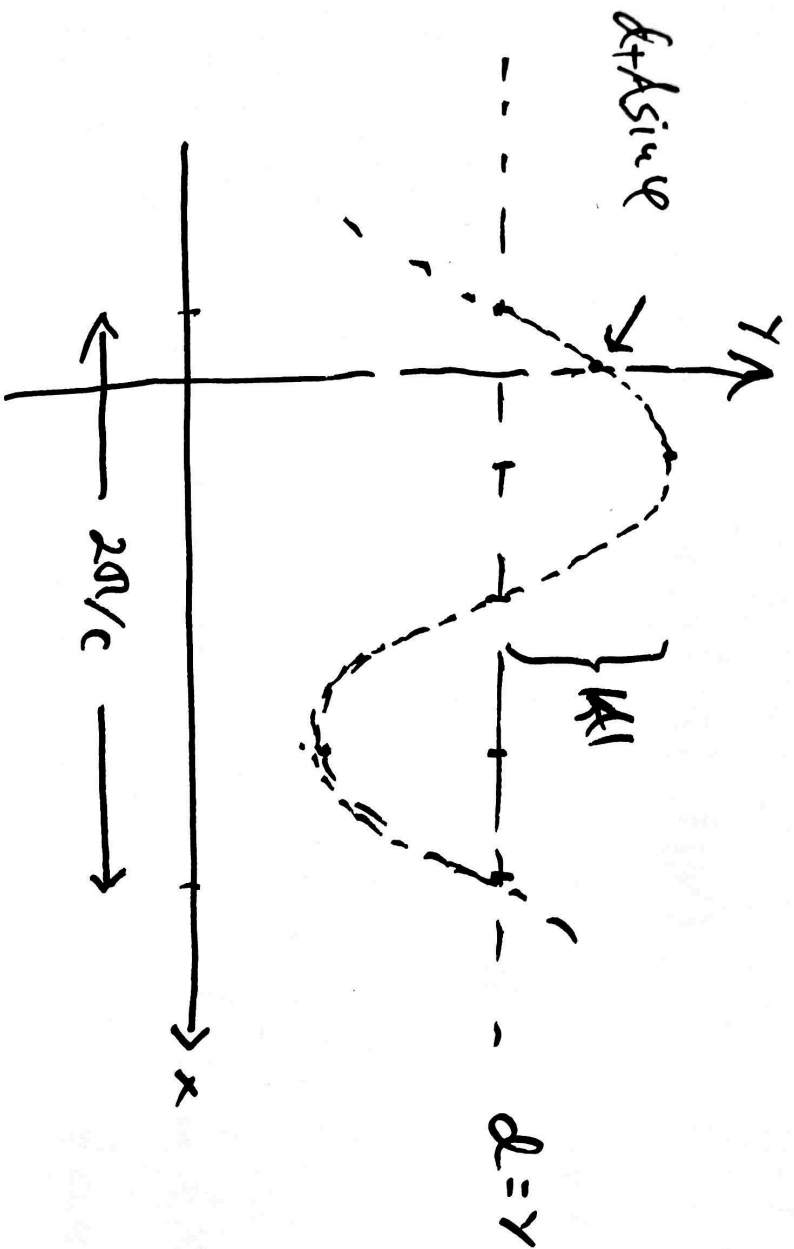
$$\sin(cx + \varphi) = \sin\left(c\left(x + \frac{\varphi}{c}\right)\right)$$

Grafen forskyves mot venstre med $\frac{\varphi}{c}$.

Kan avgrensse oss til

$$A \geq 0, \quad c > 0, \quad 0 \leq \varphi < 2\pi$$

(siden: $\sin(x + \pi) = -\sin x$)



Beskriv som en harmonisk svängning

$$\cos^2 x = \cos^2 x - \underbrace{\sin^2 x}_{1 - \cos^2 x} = 2 \cos^2 x - 1$$

$$\begin{aligned} \cos^2 x &= \frac{1}{2} (\cos(2x) + 1) = \frac{1}{2} \cos(2x) + \frac{1}{2} \\ &= \frac{1}{2} \sin\left(2x + \frac{\pi}{2}\right) + \frac{1}{2} \end{aligned}$$

$$A = \frac{1}{2}, \quad \omega = \frac{1}{2}, \quad c = 2, \quad \varphi = \frac{\pi}{2} \quad \text{Perioden } \pi$$

$$\sin x \cos x = \frac{1}{2} \sin(2x)$$

$$A = \frac{1}{2}, \quad c = 2$$

Periode π

$$\varphi = 0, \quad d = 0$$

$$a \sin x + b \cos x = A \sin(x + \varphi)$$

$$A = \sqrt{a^2 + b^2}$$

$$\tan \varphi = \frac{b}{a}$$

$$a \neq 0$$

$$\varphi = \arctan\left(\frac{b}{a}\right) \text{ evenfalls } + \pi.$$

Kommer für:

$$A \sin(x + \varphi) = \frac{A \cos \varphi}{a} \cdot \sin x + \frac{A \sin \varphi}{b} \cos x.$$

Oblig 5

#11 d)

$$\cos(x-1) < 2 \cos^2(x-1)$$

$$x \in [0, \pi)$$

I $y = x-1$, $x = y+1$ $y \in [-1, \pi-1]$.

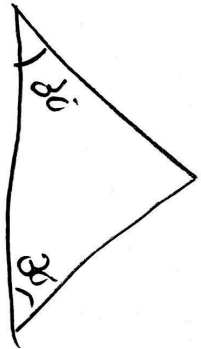
$$\cos(y) - 2 \cos^2 y < 0$$

II $\cos(y) = z$

$$z - 2z^2 < 0$$

III $z(1-2z) < 0$

4b)



4 miligheter.
milst en av sidena har längd 10

