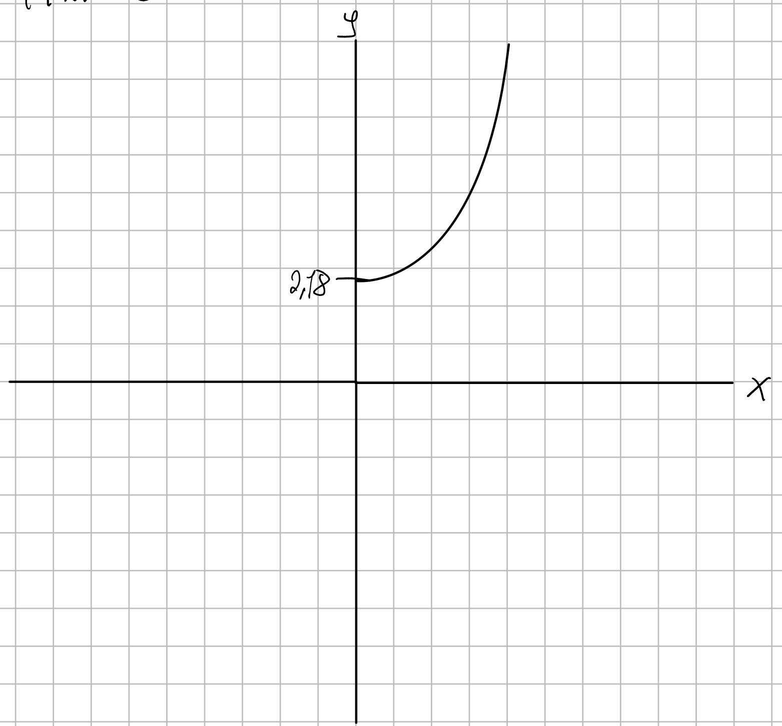
0) $f: \mathbb{R} \to \mathbb{R}$
$f(x) = x^2$

Domene: $\mathbb{R}$
Kodomene: $\mathbb{R}$

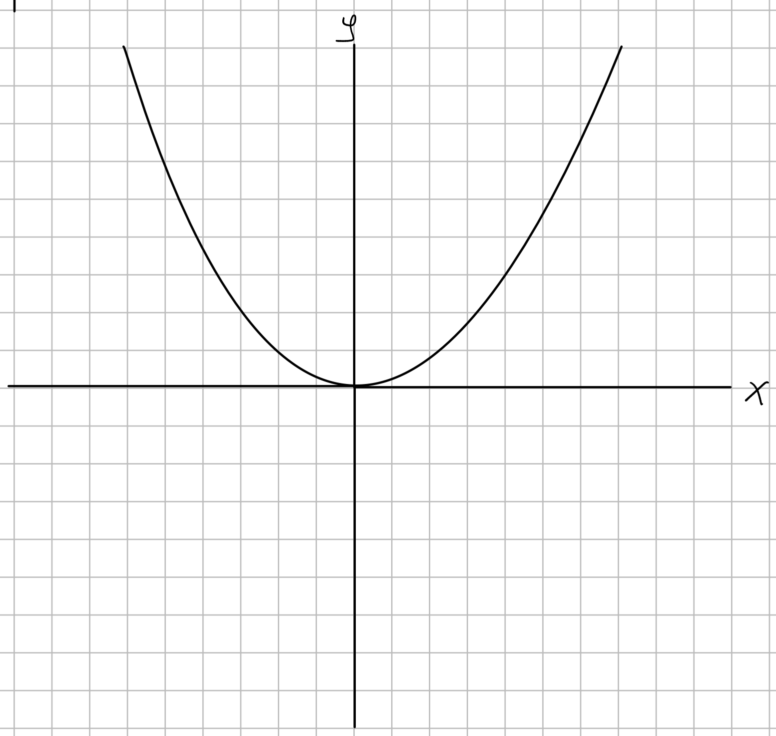
1) Bildet: x^2

4)

$f: \mathbb{R} \to \mathbb{R}$
$f(x) = e^x$

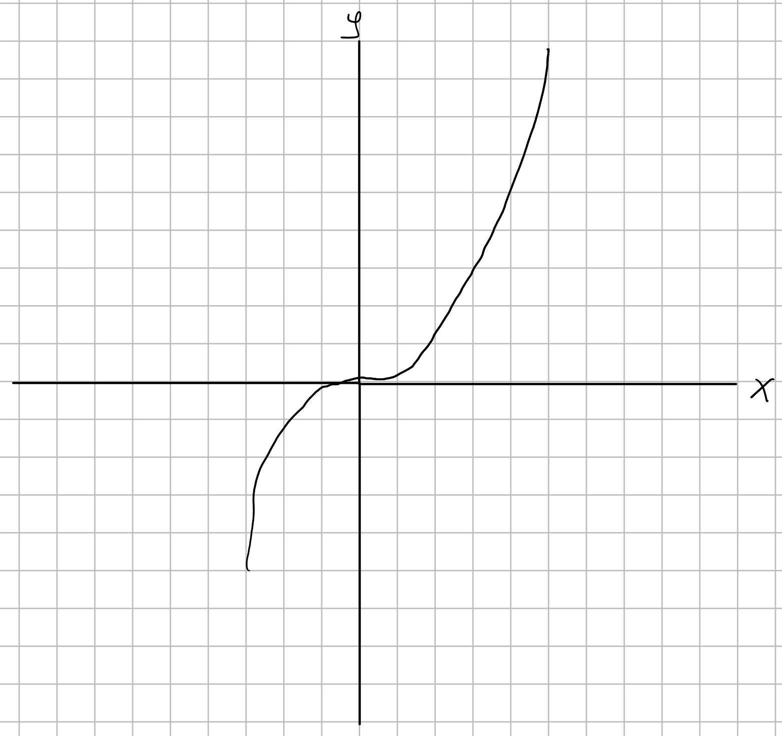


$g: \mathbb{R} \to \mathbb{R}$
$g(x) = x^2$



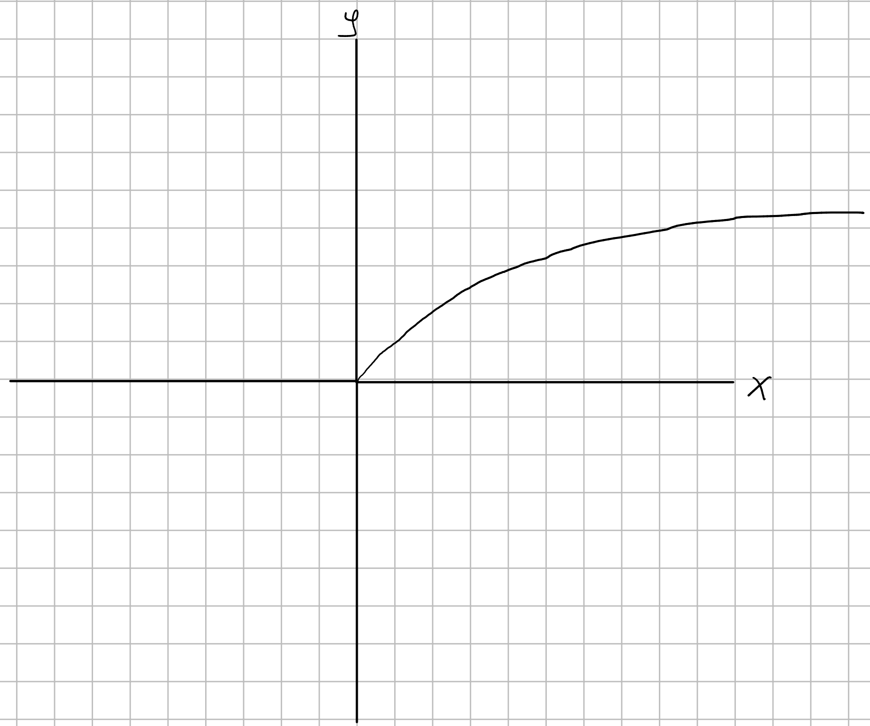
$h: \mathbb{R} \to \mathbb{R}$

$h(x) = x^3$



$i: \mathbb{R} \to \mathbb{C}$

$i(x) = \sqrt{x}$



5) Graph

6)

$pH([H_3O^+]) = -\log[H_3O^+]$

$f: (0, \infty) \to \mathbb{R}$

Positive tall til reelle tall

7)

$pH = -\log[H_3O^+]$

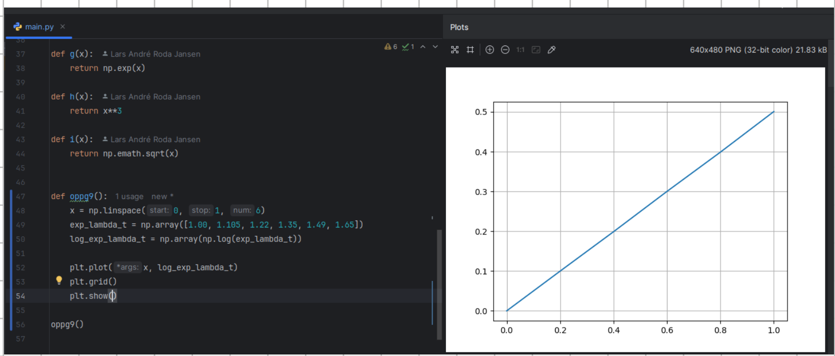
$pH = -\log[H_3O^+] \cdot 10^3$ ml

8)

ln naturlige logaritme aka e som basis

log logaritme med 10 som basis

9)



$e^{\lambda t} \Rightarrow \lambda = \frac{1}{2}$

10) Mul faktor $= 1{,}105$

1 2) $f: \mathbb{R} \to \mathbb{R}$

$f(y) = e^y$

Bildet er e^y

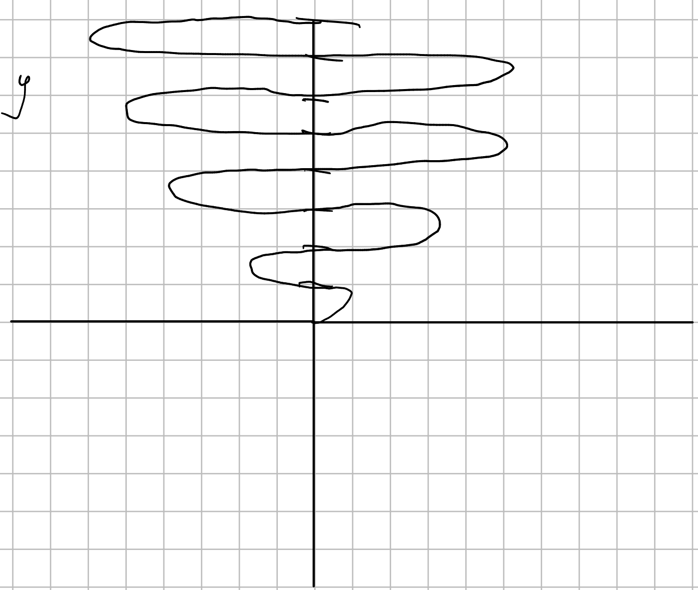
$g: (0, \infty) \to \mathbb{R}$

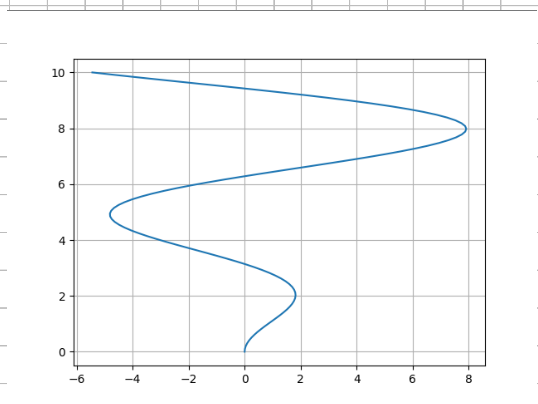
$g(y) = \ln y$

Bildet er $\ln y$

1 3)

$x = y \sin y$





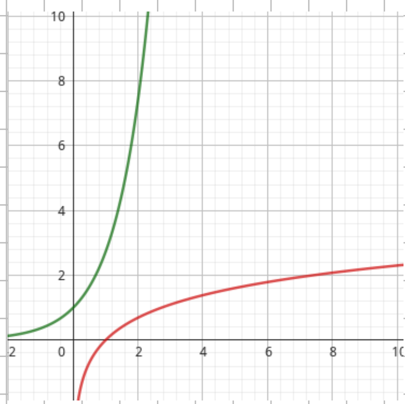
1 5) $f: \mathbb{R} \to \mathbb{R}$ $\quad f(x) = e^x$

$y = f(x)$

$y = e^x$

$\ln y = x$

$x = f^{-1}(y) = \ln y$



1 6) $f(x) = x^2 + 2x + 2$

$y = f(x)$

$y = x^2 + 2x + 2$

$x^2 + 2x = y - 2$

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

To variabler
1 likning ?

$x^2 + 2x + 2 = 0$

$x = \dfrac{-2 \pm \sqrt{4-8}}{2}$

$x = -1 \pm i$

Funker ikke

1 7) $f: [0,1] \to \mathbb{R}$

$f(x) = 2x^2 + 2x + 2$

$y = f(x)$

$y = 2x^2 + 2x + 2$

$2x^2 + 2x + 2 - y = 0$

$x^2 + x + 1 - \frac{1}{2}y = 0$

$x = \frac{-1 \pm \sqrt{1^2 - 4(1 - \frac{1}{2}y)}}{2}$

$x = \frac{-1 \pm \sqrt{1 - 4 + 2y}}{2}$

$x = \frac{-1 \pm \sqrt{-3 + 2y}}{2}$

$f^{-1}(y) = x = -\frac{1}{2} \pm \frac{1}{2}\sqrt{(-3 + 2y)}$

$f(0) = 2$

$f^{-1}(2) = -\frac{1}{2} \pm \frac{1}{2}\sqrt{(-3 + 4)}$

$= -\frac{1}{2} \pm \frac{1}{2}$

$= 0$

$f^{-1}(y) = x = -\frac{1}{2} + \frac{1}{2}\sqrt{(-3 + 2y)}$

2 1)

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \qquad p(s) = f(x) + f'(x)(s - x)$$

$$f(x) = x^2$$

$$f'(x) = \lim_{h \to 0} \frac{(x+h)^2 - x^2}{h}$$

$$= \lim_{h \to 0} \frac{x^2 + 2xh + h^2 - x^2}{h}$$

$$= \lim_{h \to 0} \frac{h(2x + h)}{h}$$

$$= \lim_{h \to 0} 2x + h$$

$$= 2x$$

2 2) $f(x) = x^n$

$$f'(x) = \lim_{h \to 0} \frac{(x+h)^n - x^n}{h}$$

$$\binom{n}{r} = \frac{n!}{r!(n-r)!} \qquad 0! = 1 \qquad \binom{n}{0} = 1 \qquad \binom{n}{1} = n \qquad \binom{n}{n} = 1$$

$$(x+h)^n = \sum_{r=0}^{n} \binom{n}{r} x^{(n-r)} h^{(r)}$$

$$(x+h)^n = \binom{n}{0} x^{(n-0)} h^{(0)} + \binom{n}{1} x^{(n-1)} h^{(1)} + \dots + \binom{n}{n} x^{(n-n)} h^{(n)}$$

$$f'(x) = \lim_{h \to 0} \frac{(x+h)^n + x^n}{h}$$

$$= \lim_{h \to 0} \frac{\binom{n}{0} x^{(n-0)} h^0 + \binom{n}{1} x^{(n-1)} h^1 + \dots + \binom{n}{n} x^{(n-n)} h^n - x^n}{h}$$

$$= \lim_{h \to 0} \frac{x^n + n x^{n-1} h + h^n - x^n}{h}$$

$$= \lim_{h \to 0} \frac{n x^{n-1} h + h^n}{h}$$

$$= \lim_{h \to 0} \frac{h(n x^{n-1} + h^{n-1})}{h}$$

$$= \lim_{h \to 0} n x^{n-1} + h^{n-1}$$

$$= n x^{n-1}$$

23)

$$\frac{d}{dx} f^{-1}(x) = \frac{1}{f'(f^{-1}(x))}$$

$$\frac{d}{dx} f(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$y = f^{-1}(x)$$

$$f(y) = x$$

$$\frac{d}{dx}\left(f(y)\right) = \frac{d}{dx}(x)$$

$$f'(y) \cdot \frac{dy}{dx} = 1$$

$$\frac{d}{dx} y = \frac{1}{f'(y)}$$

$$\frac{d}{dx} f^{-1}(x) = \frac{1}{f'(f^{-1}(x))}$$

$$\frac{d}{dx} \arctan(x) = \frac{1}{1 + x^2} \qquad \tan x = \frac{\sin x}{\cos x}$$

$$e^{ix} = \cos x + i \sin x \qquad e^{-ix} = \cos x - i \sin x$$

$$\cos x = e^{ix} - i \sin x \qquad \sin x = \frac{1}{i}\left(\cos x - e^{-ix}\right)$$

$$\cos x = e^{ix} - \cos x + e^{-ix}$$

$$\cos x = \frac{1}{2}\left(e^{ix} + e^{-ix}\right)$$