Logaritmisk skala (plot)

```
> restart
> with(plots) :
```

Log på 2. aksen (eksponentialfunktion)

En **eksponentialfunktion** har en ret linje som graf i et koordinatsystem, hvor **1. aksen er alm. og 2. aksen er logaritmisk.**

Bevis:

Antag, at $\log(y)$ som funktion af x er en ret linje.

$\log(y) = \alpha \cdot x + \beta \Leftrightarrow y = 10^{\alpha \cdot x + \beta} \Leftrightarrow y = 10^{\alpha \cdot x} \cdot 10^{\beta} \Leftrightarrow y = \left(10^{\alpha}\right)^{x} \cdot 10^{\beta}$

Kaldes 10^{α} for a , og 10^{β} for b, får man:

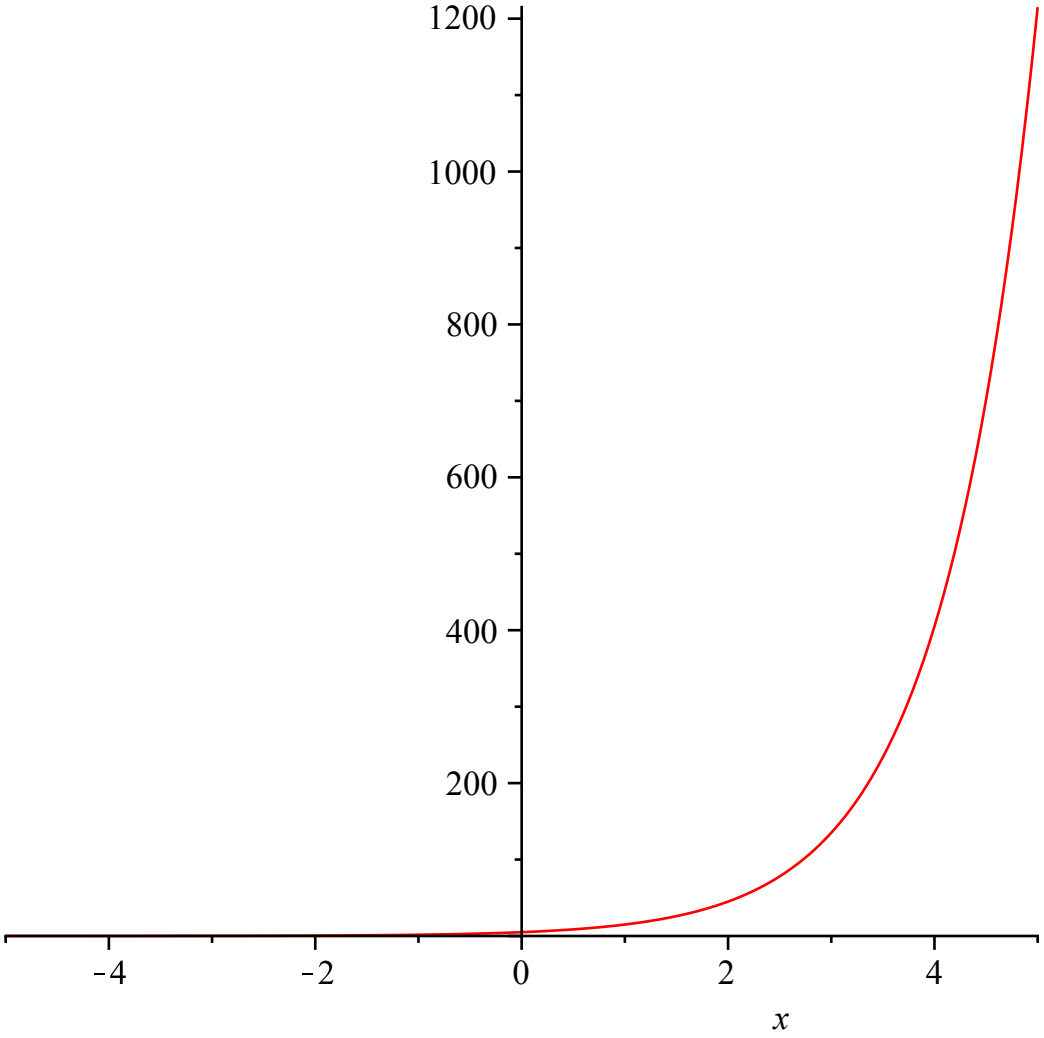
$y = a^{x} \cdot b \Leftrightarrow \mathbf{y = b \cdot a^{x}}$

Altså en eksponentialfunktion.

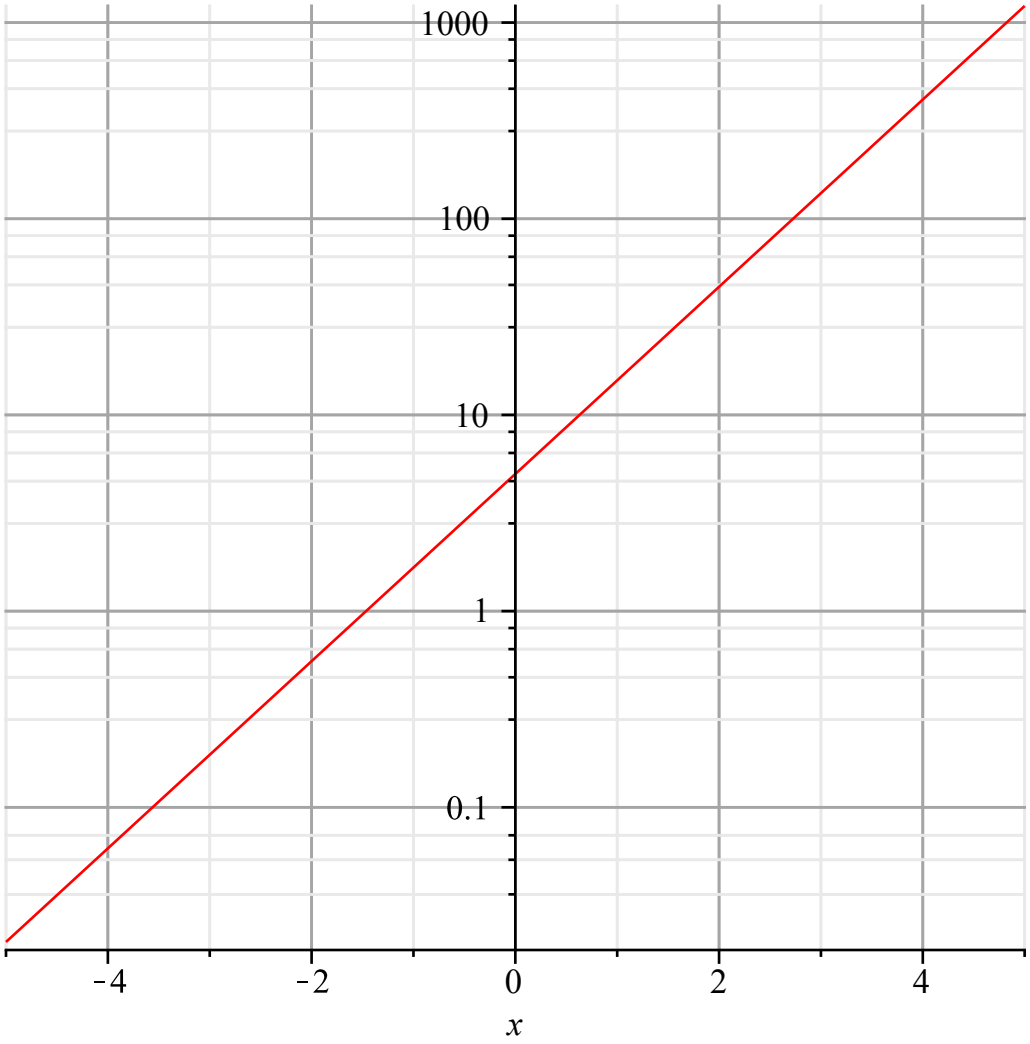
```
> f := x -> 5*3^x
```

$$f := x \to 5\,3^{x} \qquad \textbf{(1.1)}$$

```
> plot(f(x), x = -5..5)
```




```
> logplot(f(x), x=-5..5, gridlines=true)
```



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```
> restart
> with(GymMat)
```

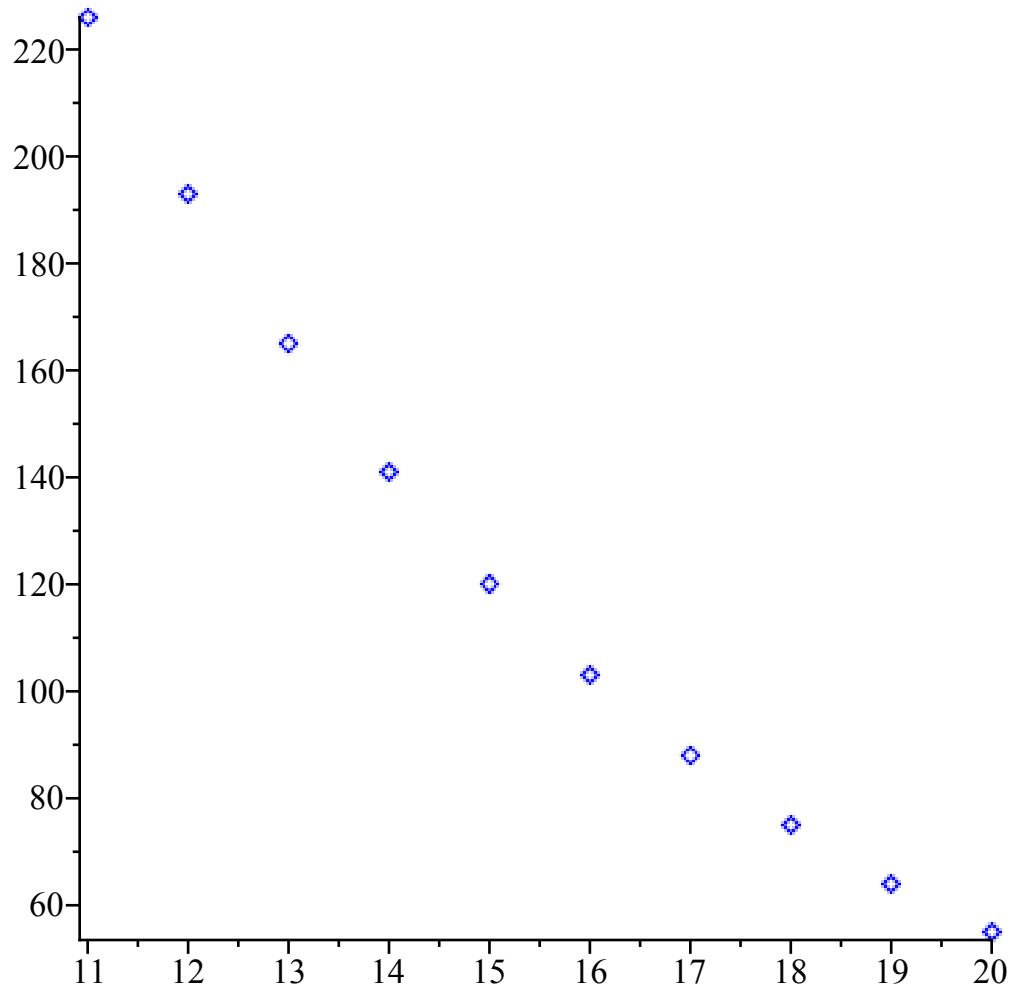
[*ArcCos*, *ArcSin*, *ArcTan*, *BoksPlot*, *Con*, *Cos*, *EkspReg*, *EkspRegPlot*, *ExpReg*, *ExpRegPlot*, *Forklar*, *Histogram*, *InvCos*, *InvSin*, *InvTan*, *KumFrekv*, *LinReg*, *LinRegPlot*, *MultiSolve*, *PindeDiagram*, *PlotPunkter*, *PotReg*, *PotRegPlot*, *PowReg*, *PowRegPlot*, *Sin*, *SumKurve*, *Tan*, *TilpasFunktion*, *TrappeDiagram*, *TrigSolve*, *Version*, *VisPlots*, *con*] **(1.1.1)**

```
> X := [11, 12, 13, 14, 15, 16, 17, 18, 19, 20];
  Y := [226, 193, 165, 141, 120, 103, 88, 75, 64, 55]
```

$$X := [11, 12, 13, 14, 15, 16, 17, 18, 19, 20]$$

$$Y := [226, 193, 165, 141, 120, 103, 88, 75, 64, 55] \quad \textbf{(1.1.2)}$$

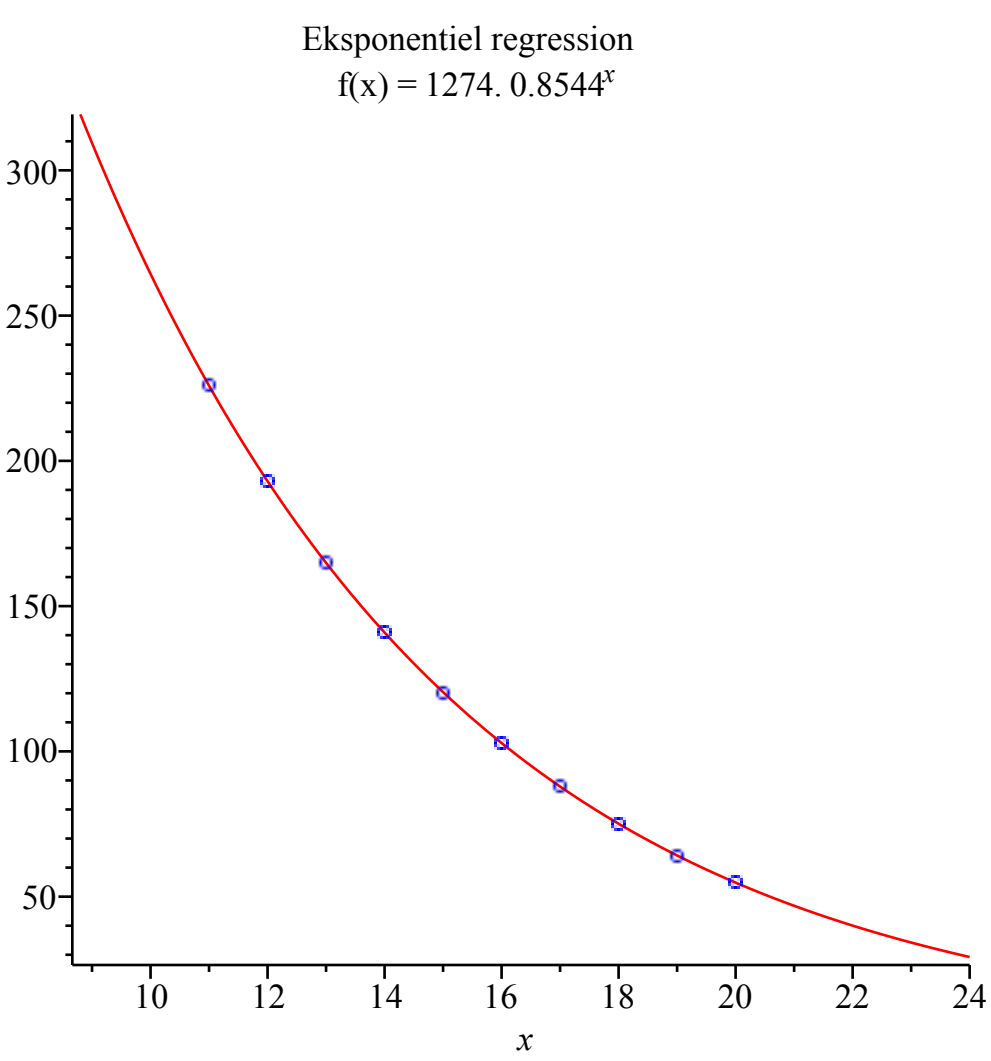
```
> PlotPunkter(X, Y)
```




```
> ExpReg(X, Y)
"r^2"
.9999836719
```

$$x \rightarrow 1274.483\ 0.8544462^{x} \qquad \textbf{(1.1.3)}$$

```
> ExpRegPlot(X, Y)
"r^2"
.9999836719
```



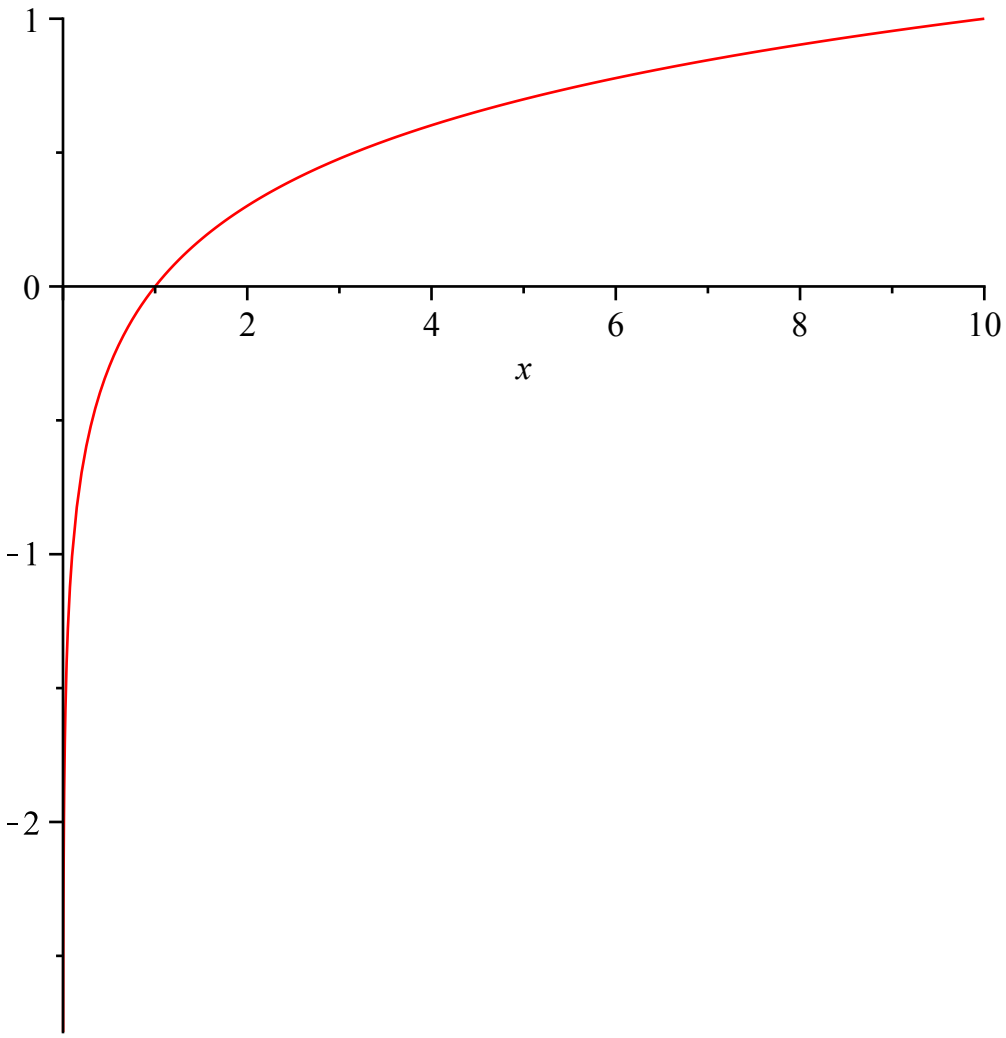
Log på 1. aksen

En **logaritmefunktion** har en ret linje som graf i et koordinatsystem, hvor **1. aksen er logaritmisk og 2. aksen er alm.**

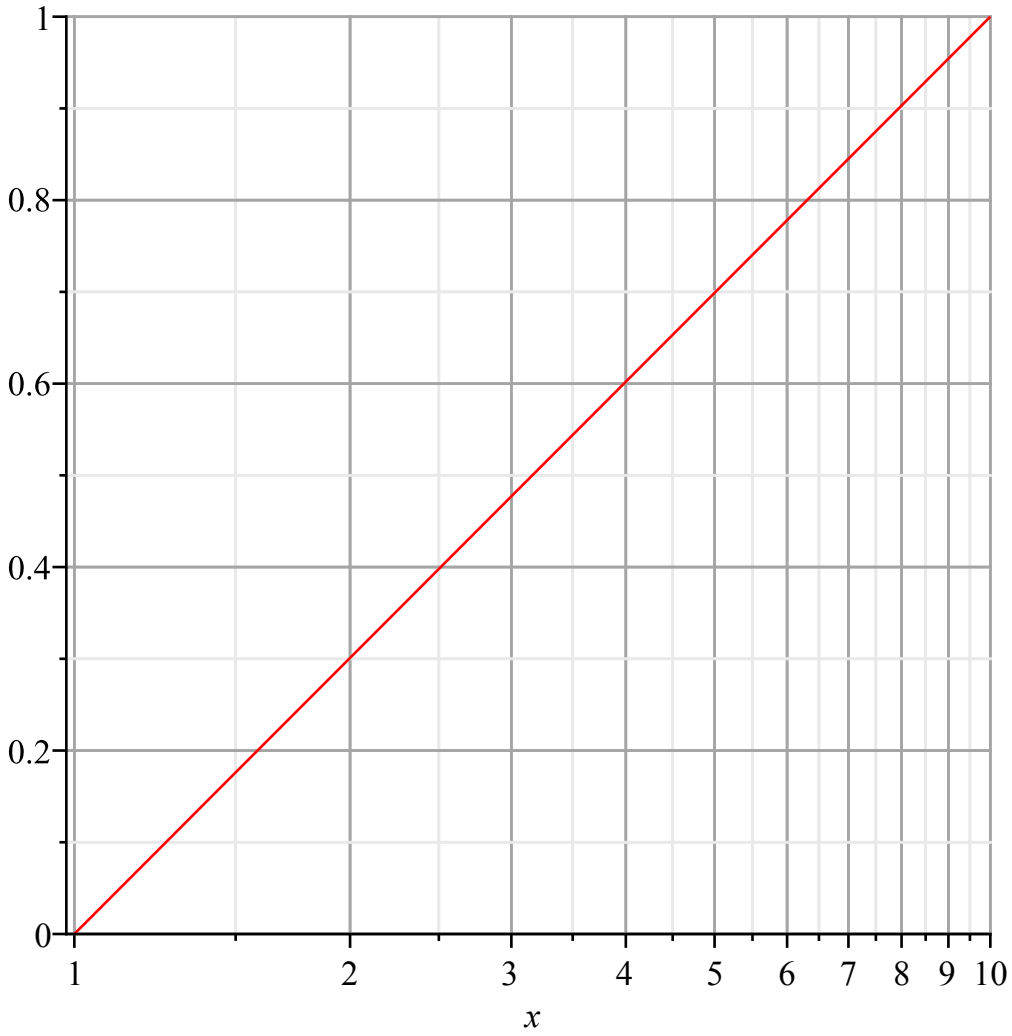
```
> restart
> with(plots) :
> g := x→log10(x)
```

$$g := x \rightarrow \log10(x) \qquad \textbf{(2.1)}$$

```
> plot(g(x), x = 0..10)
```




```
> semilogplot(g(x), x = 1 ..10, gridlines = true)
```



Log på både 1. aksen og 2. aksen (potensfunktion)

En **potensfunktion** har en ret linje som graf i et koordinatsystem, hvor **både 1. aksen og 2. aksen er logaritmisk.**

Bevis:

Antag, at $\log(y)$ som funktion af $\log(x)$ er en ret linje.

$\log(y) = \alpha \cdot \log(x) + \beta \Leftrightarrow y = 10^{\alpha \cdot \log(x) + \beta} \Leftrightarrow y = 10^{\alpha \cdot \log(x)} \cdot 10^{\beta} \Leftrightarrow y = \left(10^{\log(x)}\right)^{\alpha} \cdot 10^{\beta} \Leftrightarrow y = x^{\alpha} \cdot 10^{\beta}$

Kaldes α for a, og 10^{β} for b, får man:

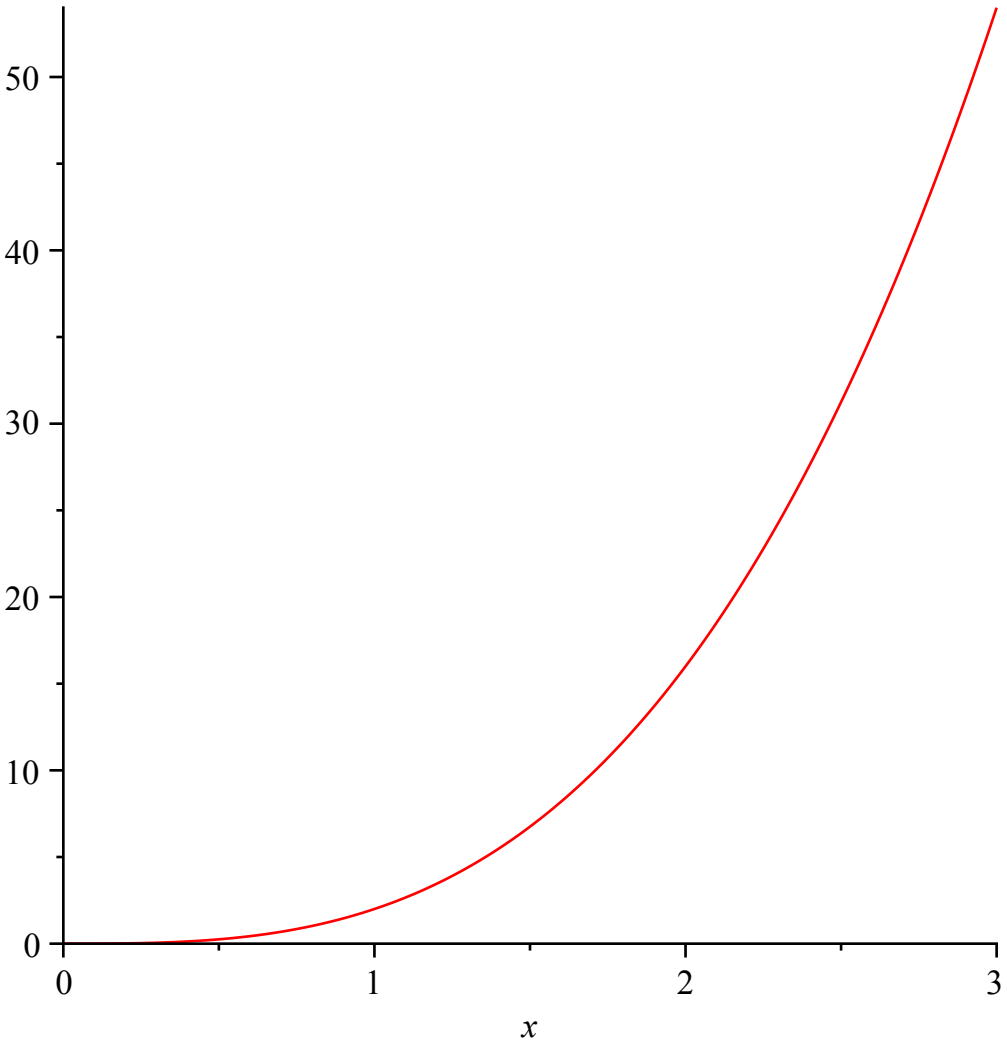
$y = x^{a} \cdot b \Leftrightarrow \boldsymbol{y = b \cdot x^{a}}$

Altså en potensfunktion.

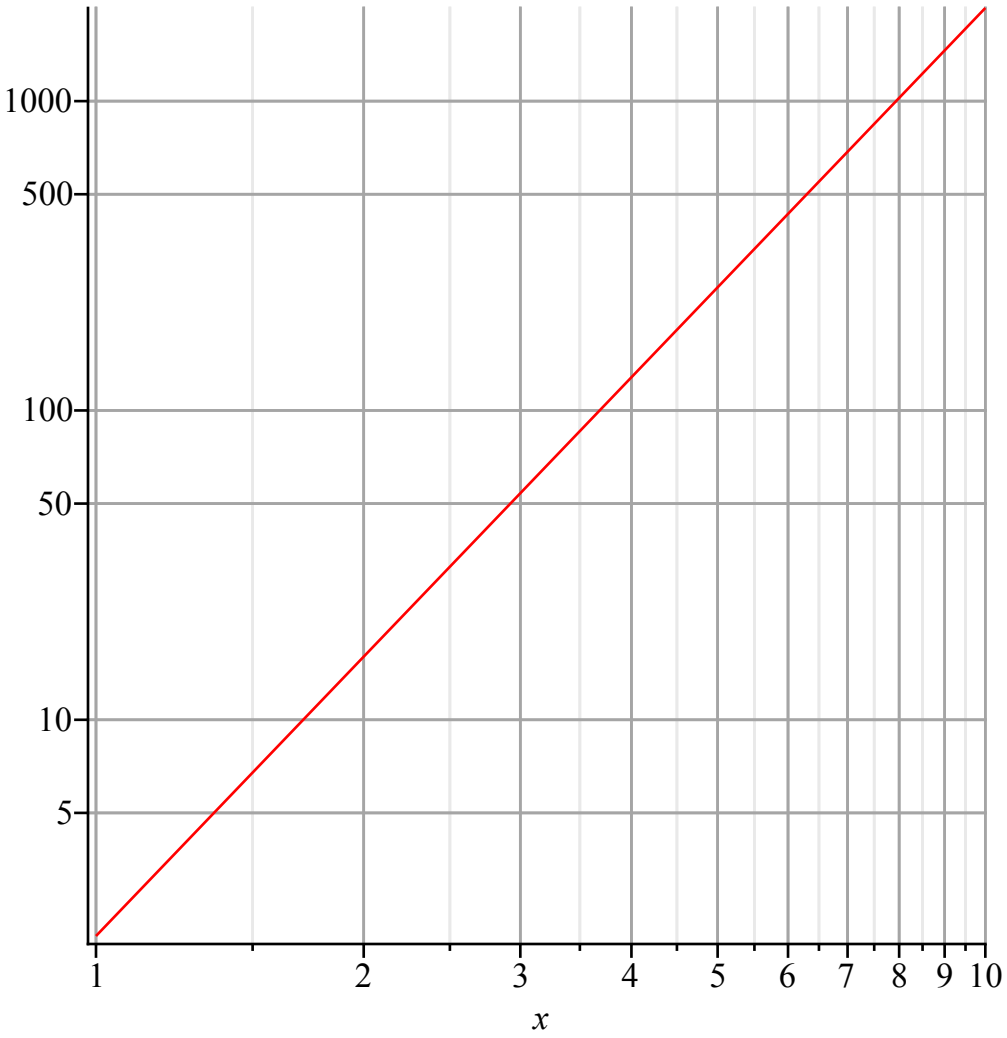
```
> restart
> with(plots):
> h := x→2·x^3
```

$$h := x \to 2\,x^3 \tag{3.1}$$

```
> plot(h(x), x = 0..3)
```




```
> loglogplot(h(x), x = 1..10, gridlines = true)
```



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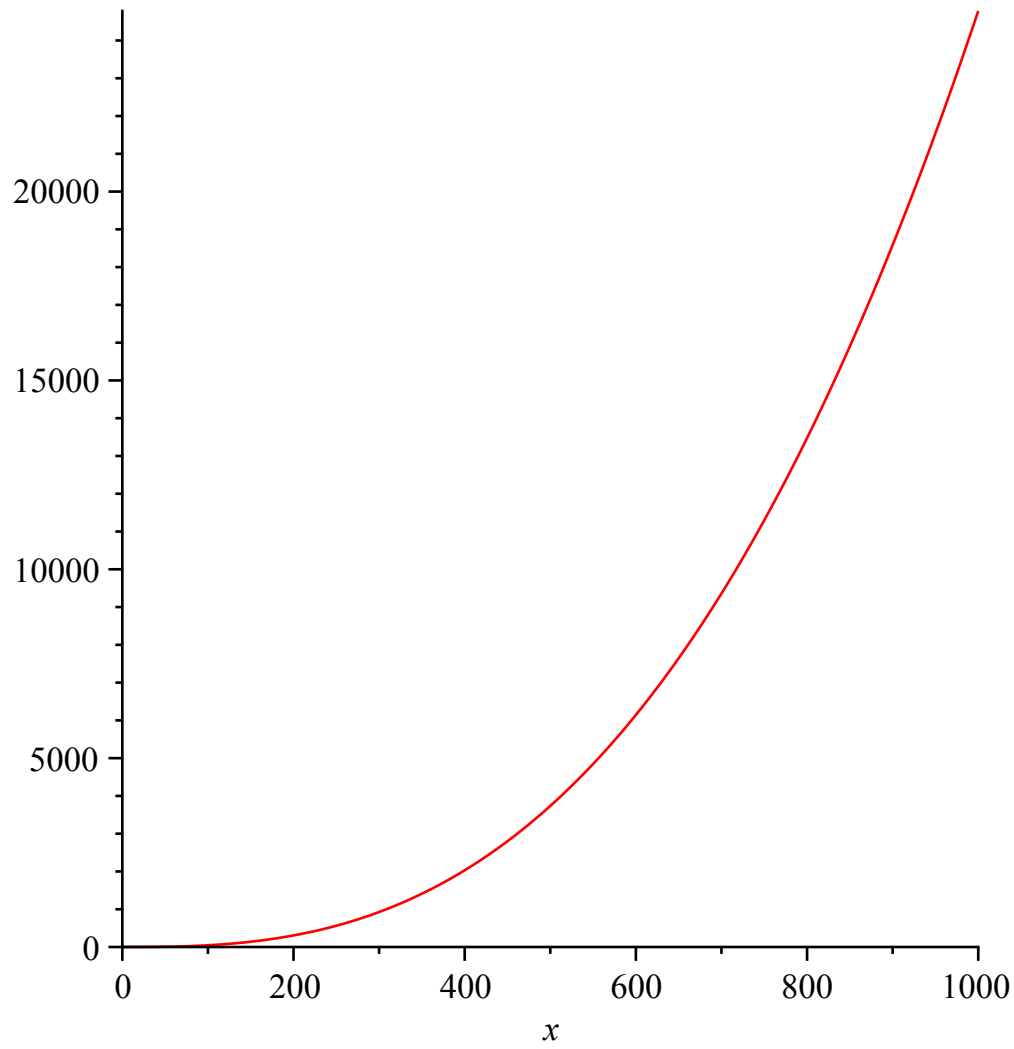
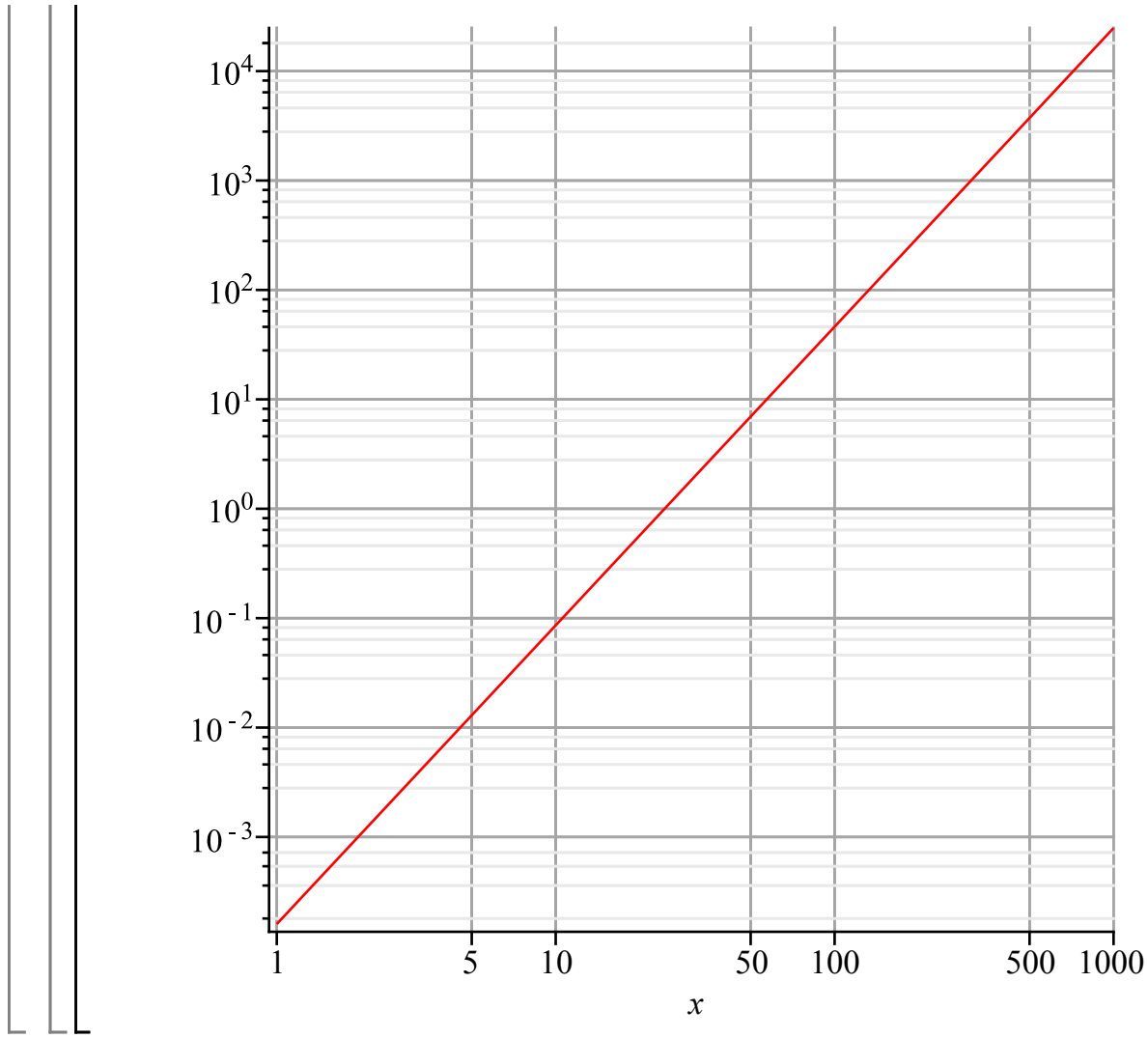
```
> restart
> with(plots) :
> f := 0.00016·x^2.73
```

$$f := 0.00016\,x^{2.73} \qquad \textbf{(3.1.1)}$$

```
> plot(f(x), x = 0..1000)
```



> $loglogplot(f(x), x = 1..1000, gridlines = true)$


10^4
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
1
5
10
50
100
500
1000
x