

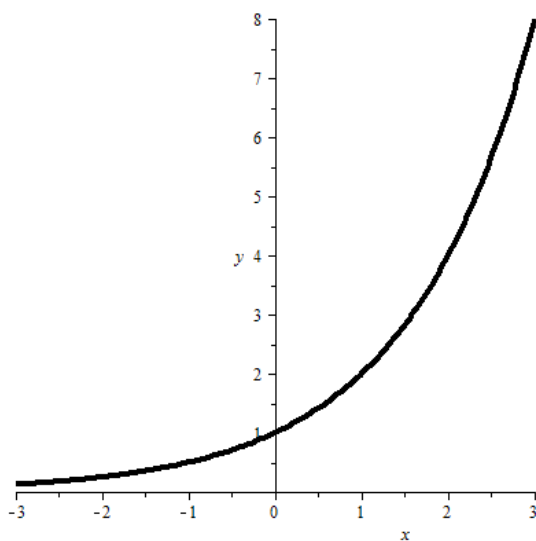
Exponentialfunktion

Definition

f: $D \rightarrow \mathbb{R}$	$(D \subseteq \mathbb{R})$
$x \mapsto y = f(x) = c \cdot a^x$	$(a \in \mathbb{R}^+ \setminus \{1\}, c \in \mathbb{R} \setminus \{0\})$
$a > 1$: exponentielles Wachstum	
$a < 1$: exponentieller Zerfall	

Graf

1. $y = f(x) = 2^x$ ($c = 1, a = 2$)

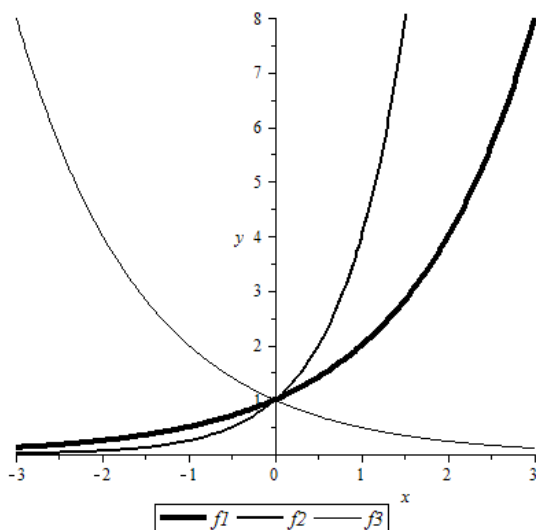


2. Parameter **a** (**a verändern**, c konstant halten)

$$y = f_1(x) = 2^x \quad (c = 1, a = 2)$$

$$y = f_2(x) = 4^x \quad (c = 1, a = 4)$$

$$y = f_3(x) = \left(\frac{1}{2}\right)^x \quad \left(c = 1, a = \frac{1}{2}\right)$$

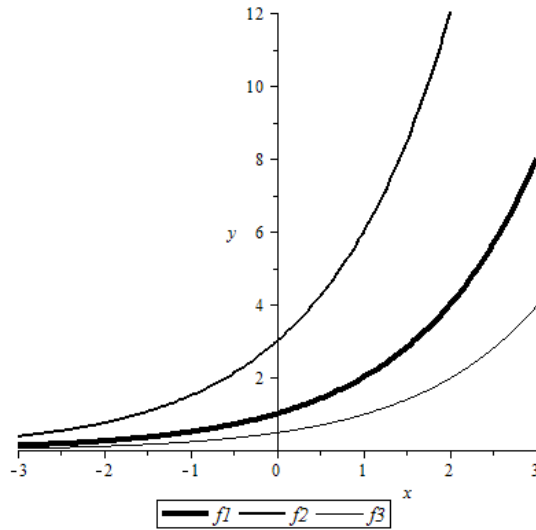


3. Parameter **c** (c verändern, a konstant halten)

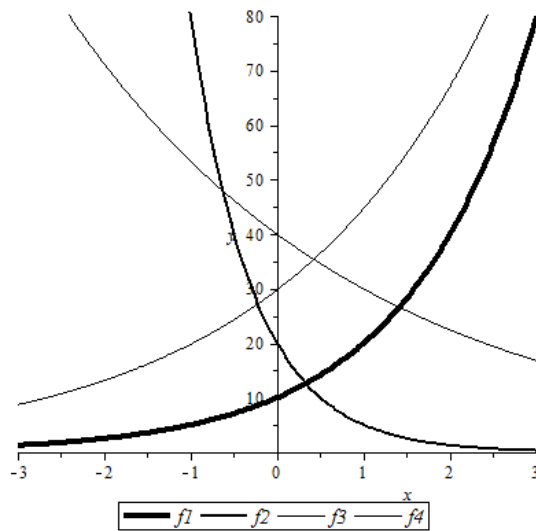
$y = f_1(x) = 2^x$ (c = 1, a = 2)

$y = f_2(x) = 3 \cdot 2^x$ (c = 3, a = 2)

$y = f_3(x) = \frac{1}{2} \cdot 2^x$ (c = $\frac{1}{2}$, a = 2)



4. $y = f_1(x) = 10 \cdot 2^x$ (c = 10, a = 2)
 $y = f_2(x) = 20 \cdot 0.25^x$ (c = 20, a = 0.25)
 $y = f_3(x) = 40 \cdot 0.75^x$ (c = 40, a = 0.75)
 $y = f_4(x) = 30 \cdot 1.5^x$ (c = 30, a = 1.5)



Beispiele

1. Zinseszins (exponentielles **Wachstum**)

$$K_n = K_0 \cdot q^n$$

K_0 = Anfangskapital
 K_n = Kapital nach n Zinsperioden
 n = Anzahl Zinsperioden (häufig: 1 Zinsperiode = 1 Jahr)
 q = Zins-/Wachstumsfaktor = $1 + i$ ($i > 0$, $q > 1$)
 i = Zinssatz pro Zinsperiode

$$\text{Bsp.: } K_0 := 1000 \text{ CHF, } i := 2\% = 0.02 \Rightarrow q = 1.02 \Rightarrow K_n = 1000 \cdot 1.02^n \text{ CHF}$$

2. Preisindex (exponentieller **Zerfall**)

$$P(t) = P_0 \cdot q^t$$

P_0 = Anfangspreis / anfängliche Kaufkraft
 $P(t)$ = Preis / Kaufkraft zum Zeitpunkt t (häufig: t = Anzahl Jahre)
 q = Zerfallsfaktor = $1 + i$ ($i < 0$, $q < 1$)

$$\text{Bsp.: } P_0 := 100 \text{ CHF, } i := -3\% = -0.03 \Rightarrow q = 0.97 \Rightarrow P(t) = 100 \cdot 0.97^t \text{ CHF}$$