

Exponential function

Definition

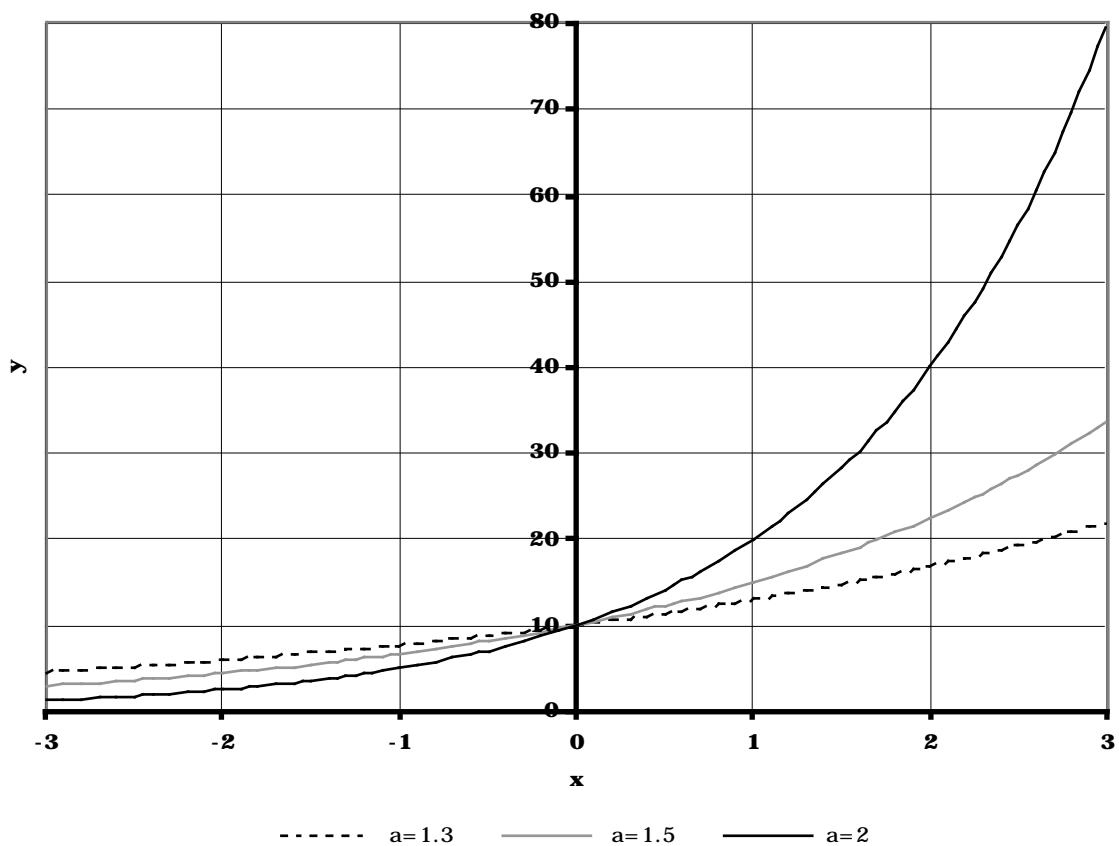
$$f: \mathbb{R} \rightarrow \mathbb{R}$$

$$x \mapsto y = f(x) = c \cdot a^x \quad (a \in \mathbb{R}^+ \setminus \{1\}, c \in \mathbb{R} \setminus \{0\})$$

Graph

$c := 10$

$a := 1.3, 1.5, 2$



Example

Compound interest

$$C_n = C_0 \cdot q^n$$

C_0 = initial capital

C_n = capital after n compounding periods

n = number of compounding periods (typically: 1 compounding period = 1 year)

q = growth factor = $1 + r$

r = interest rate per compounding period

Ex.: $C_0 := 1000, r := 2\% = 0.02 \quad q = 1.02 \quad C_n = 1000 \cdot 1.02^n$

$$C_n = C_0 \cdot q^n \quad C_0 = \frac{C_n}{q^n} \quad q = \sqrt[n]{\frac{C_n}{C_0}} \quad n = \frac{\log_a \frac{C_n}{C_0}}{\log_a(q)}$$