Compound Annual Growth Rates

Data

$K_0 := 100$ — Initial value

$K_t := 144$ — Final value after *t* years

$t := 2$ — Number of years

$m := 12$ — Number of compoundings per year

Results

$$i := \left(\frac{K_t}{K_0}\right)^{\frac{1}{t}} - 1 = 0.2$$

CAGR [Compound Annual Growth Rate], if growth is compounded at the end of each year only.
Compounding period = 1 year

$$i_m := m \cdot \left[\left(\frac{K_t}{K_0}\right)^{\frac{1}{m \cdot t}} - 1\right] = 0.183714$$

CAGR, if growth takes place at the end of each compounding period.
Compounding period = 1/*m* year

$$i_s := \frac{\ln\left(\frac{K_t}{K_0}\right)}{t} = 0.182322$$

CAGR, if growth is continuous.
Compounding period ⟶ 0

Data

$K_0 := 100$ — Initial value

$t := 2$ — Number of years

$m := 12$ — Number of compoundings per year

$i := 0.2$ — CAGR

Results

$$K_t := K_0 \cdot (1 + i)^t = 144$$

Final value after *t* years, if growth is compounded at the end of each year.

$$K_{tm} := K_0 \cdot \left(1 + \frac{i}{m}\right)^{m \cdot t} = 148.691$$

Final value after *t* years, if growth is compounded *m* times a year.

$$K_{ts} := K_0 \cdot e^{i \cdot t} = 149.182$$

Final value after *t* years, if growth is continuous.

Compound Annual Growth Rates

Data

$K_t := 144$	Final value after *t* years
$t := 2$	Number of years
$m := 12$	Number of compoundings per year
$i := 0.2$	CAGR

Results

$K_0 := K_t \cdot (1 + i)^{-t} = 100$

Initial value, if growth is compounded at the end of each year.

$K_{0m} := K_t \cdot \left(1 + \frac{i}{m}\right)^{-m \cdot t} = 96.845$

Initial value, if growth is compounded *m* times a year.

$K_{0s} := K_t \cdot e^{-i \cdot t} = 96.526$

Initial value, if growth is continuous.

Data

$K_0 := 100$	Initial value
$K_t := 144$	Final value after *t* years
$m := 12$	Number of compoundings per year
$i := 0.2$	CAGR

Results

$$t := \frac{\ln\left(\frac{K_t}{K_0}\right)}{\ln(1 + i)} = 2$$

Duration of the growth process in years, if growth takes place at the end of each year.

$$t_m := \frac{\ln\left(\frac{K_t}{K_0}\right)}{m \cdot \ln\left(1 + \frac{i}{m}\right)} = 1.838$$

Duration of the growth process in years, if growth takes place *m* times a year.

$$t_s := \frac{\ln\left(\frac{K_t}{K_0}\right)}{i} = 1.823$$

Duration of the growth process in years, if growth is continuous.

Compound Annual Growth Rates

Data

$i := 0.2$ CAGR, if growth takes place at the end of each year.

$m := 12$ Number of compoundings per year

Results

$i_m := m \cdot \sqrt[m]{1 + i} - m = 0.183714$ Equivalent CAGR, if growth takes place *m* times a year.

$i_s := \ln(1 + i) = 0.182322$ Equivalent CAGR, if growth is continuous.

Data

$i_m := 0.183714$ CAGR, if growth takes place *m* times a year.

$m := 12$ Number of compoundings per year

Results

$i := \left(1 + \frac{i_m}{m}\right)^m - 1 = 0.2$ Equivalent CAGR, if growth takes place at the end of each year.

$i_s := \ln\left[\left(1 + \frac{i_m}{m}\right)^m\right] = 0.182322$ Equivalent CAGR, if growth is continuous.

Data

$i_s := 0.182322$ CAGR, if growth is continuous.

$m := 12$ Number of compoundings per year

Results

$i := e^{i_s} - 1 = 0.200001$ Equivalent CAGR, if growth takes place at the end of each year.

$i_m := m \cdot e^{\frac{i_s}{m}} - m = 0.183714$ Equivalent CAGR, if growth takes place *m* times a year.