

Chapter 2

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1 Continuous Compounding

1.1 Notation

The following notation will be used:

- $f(t)$: Balance at time t
- r : Continuous compounding interest rate

1.2 Derivation of $f(t)$

At any given time t , accrued interest is $rf(t)$. Thus:

$$\frac{df(t)}{dt} = rf(t)$$

Therefore:

$$\begin{aligned}\frac{1}{f(t)} \frac{df(t)}{dt} &= r \\ \int \frac{1}{f(t)} \frac{df(t)}{dt} dt &= \int r dt \\ \int \frac{1}{f(t)} df(t) &= rt \\ \ln f(t) &= rt \\ f(t) &= e^{rt}\end{aligned}$$