Logistic Model (continuous version) [mln32]

The (continuous) logistic model was introduced in population dynamics:

$$\frac{dN}{dt} = rN\left(1 - \frac{N}{K}\right).$$

The model has one variable and two parameters:

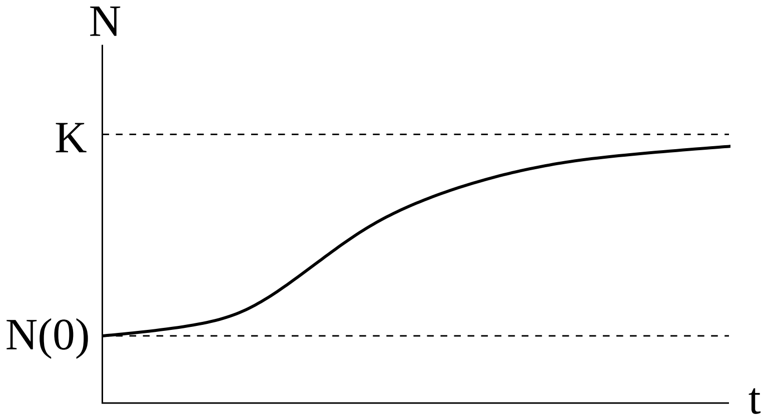
$N(t)$: instantaneous size of population,

r: per-capita growth rate,

K: carrying capacity due to limited living space and resources.

The general solution for can be obtained by separation of variables [mex107]:

$$N(t) = \frac{N(0)e^{rt}}{1 + \frac{N(0)}{K}\left(e^{rt} - 1\right)}.$$



In the limit $K \to \infty$, the solution approaches unimpeded exponential growth: $N(t) = N(0)e^{rt}$.

A discrete version of the logistic model exhibits more complex behavior.