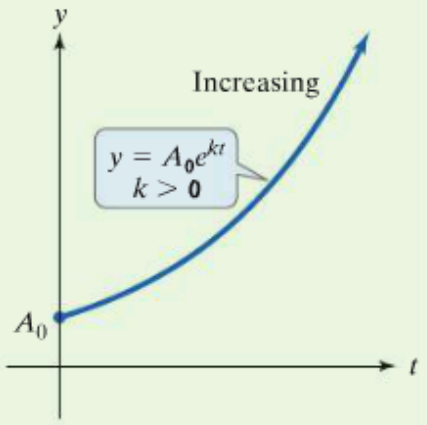
Chapter 9 Section 6
Exponential Growth and Decay; Modeling Data

Exponential Growth and Decay Models

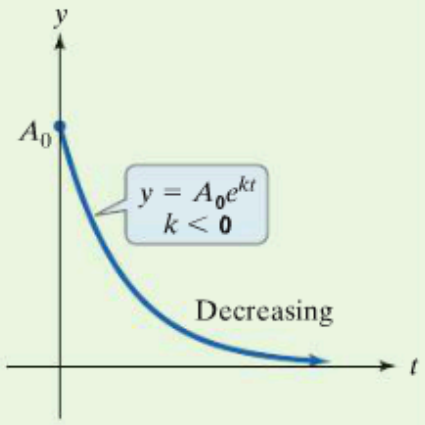
The mathematical model for **exponential growth** or **decay** is given by

$$f(t) = A_0e^{kt} \quad \text{or} \quad A = A_0e^{kt}.$$

- **If $k > 0$, the function models the amount, or size, of a *growing* entity.** A_0 is the original amount, or size, of the growing entity at time $t = 0$, A is the amount at time t, and k is a constant representing the growth rate.
- **If $k < 0$, the function models the amount, or size, of a *decaying* entity.** A_0 is the original amount, or size, of the decaying entity at time $t = 0$, A is the amount at time t, and k is a constant representing the decay rate.



(a) Exponential growth



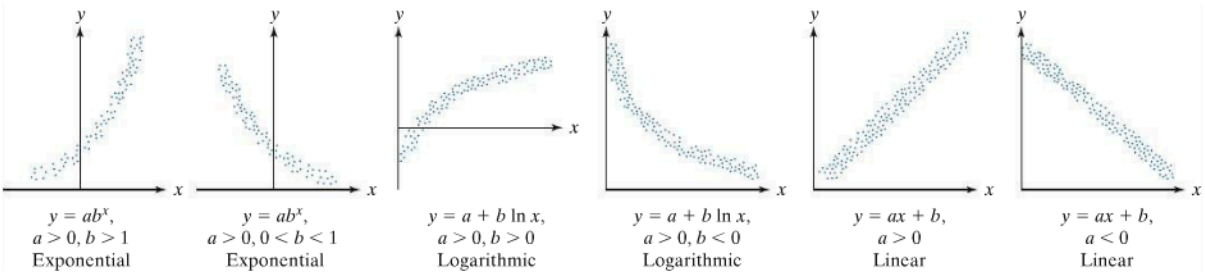
(b) Exponential decay

$A = A_0e^{kt}$

A_0 original amount at time, t = 0
A final amount after a certain time, t

k > 0, growth,
k < 0 decay.

Modeling Data



Expressing $y = ab^x$ in Base 'e'

$y = ab^x$ is equivalent to $y = ae^{(\ln b)x}$