To be more specific $\quad t$ = time in seconds

T = temp in Kelvin

$k = 5 \ s^{-1}$

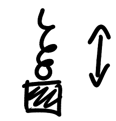
$A = 300$ K

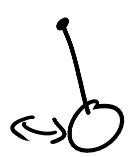
$T_0 = 2000$ K

$$T(t) = (T_0 - A)e^{-kt} + A$$
$$= 1700\, e^{-5t} + 300$$

Many models involve differential equations

* Logistic model for population: $\frac{dP}{dt} = kP(C-P)$ $\quad P(t)$ = pop.
* Harmonic oscillator:

Mass on spring  $\quad m\frac{d^2x}{dt^2} + kx = 0$ $\quad x(t)$ = position

or pendulum (approximately)  $\quad$ with friction:

$$m\frac{d^2x}{dt^2} + \gamma\frac{dx}{dt} + kx = 0.$$

* Airy equation: $\frac{d^2y}{dx^2} = xy$ models intensity of the rainbow

explains (at least approximately) the "double rainbow" phenomenon

What differential equation does it solve?

$y = e^t$, $\frac{dy}{dt} = y$ $\qquad y = \frac{1}{1-x}$, $\frac{dy}{dx} = y^2$

$y = \sin t$, $\frac{d^2y}{dt^2} = -y$ $\qquad y = \frac{1}{(1-x)^2}$, $\frac{dy}{dx} = 2y^{3/2}$