Introduction

Ordinary differential equations:

- Dynamical systems

\[ m\ddot{x} + kx = F \]

- Fluid mechanics

- Chemical reactions
  \[ \frac{dO_2}{dt} = -k_1[O_2][H_2] - k_2[O_2][C] + \ldots \]
  \[ \frac{dH_2}{dt} = -2k_1[O_2][H_2] - k_3[H_2][C] + \ldots \]

- Economics
- Biology
- ...

Notations:

- Ordinary differential equations: one independent variable
- Partial differential equations: more independent variables
- Order: order of the highest derivative
- Degree: highest degree of the dependent variable
- Linear: first degree