III. Ordinary Differential Equations

Goals:
- solve IVPs numerically
- basic methods (explicit/implicit) and their characteristics
- stability and stiff equations

Why? E.g. time evolution of CSTR
" " " tubular reactor

MATLAB: ode45, ode23s, ...

III.1 Problem statement and examples

Def.: A scalar first order Initial Value Problem (IVP) is given by

$$\frac{dy}{dt} = \dot{y}(t) = f(t, y(t))$$

because only first derivative

scalar first order Ordinary Differential Equation (ODE)

$$y(t_0) = y_0$$

Initial Value (IV)

and an interval $I = [t_0, T]$ (initial, final time) on which the solution $y(t)$ is seeked.