

What about n -th order IVPs?

Def.: A scalar n -th order IVP is given by

$$y^{(n)}(t) = f(t, y(t), \dot{y}(t), \dots, y^{(n-1)}(t))$$

n -th derivative
scalar n -th order ODE

$$y(t_0) = y_0$$

$$\dot{y}(t_0) = \dot{y}_0$$

⋮

$$y^{(n-1)}(t_0) = y_0^{(n-1)}$$

IVPs

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

Ex.: (4) Equations of motion (Newton's 2nd law)

$$m \ddot{x}(t) = F$$

mass
acceleration
force

$$x(t_0) = x_0 \quad \text{initial position}$$

$$\dot{x}(t_0) = v_0 \quad \text{initial velocity}$$