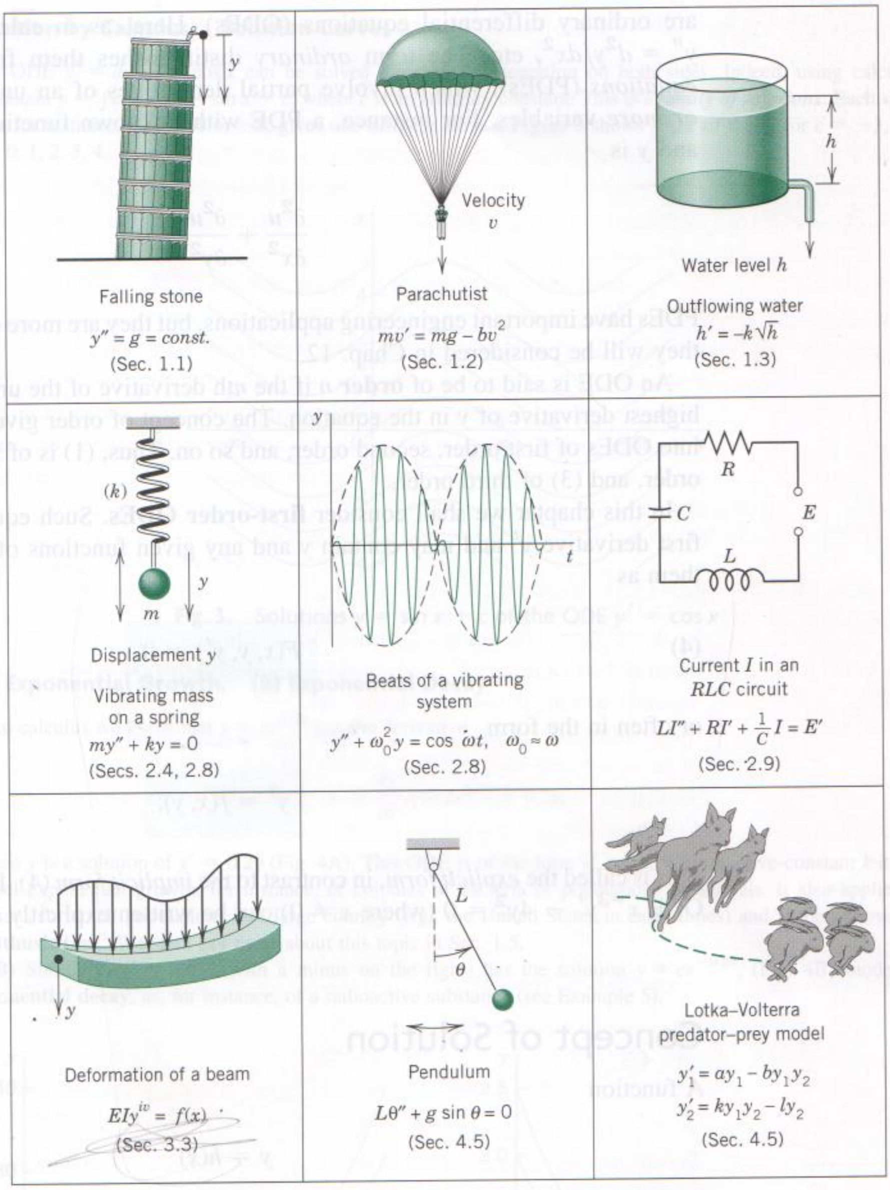

Fig. 2. Some applications of differential equations

An **ordinary differential equation (ODE)** is an equation that contains one or several derivatives of an unknown function, which we usually call $y(x)$ (or sometimes $y(t)$ if the independent variable is time t). The equation may also contain y itself, known functions of x (or t), and constants. For example,

(1) $$y' = \cos x$$

(2) $$y'' + 9y = e^{-2x}$$

(3) $$y' y''' - \frac{3}{2} y'^2 = 0$$