1 Explicit forward Euler method

Lecture 1 – 24.10.2022

Consider a first-order differential equation with boundary condition,

$$\frac{\mathrm{d}y(t)}{\mathrm{d}t} = f(y(t), t) \text{ with } y(t_0) = y_0\,. \tag{1.1}$$

As f is a known function, we know the derivative at t_0:

$$\left.\frac{\mathrm{d}y(t)}{\mathrm{d}t}\right|_{t=t_0} = f(y(t_0), t_0) = f(y_0, t_0) \tag{1.2}$$

This is enough information to write down the tangent line of the solution at $t = t_0$:

$$y_{\text{tangent}}(t) = y_0 + f(y_0, t_0)(t - t_0) \tag{1.3}$$

We can now take some $t_1 > t_0$. Given t_1 is close enough to t_0,

Put some graphic here