Mathematics 2A
HSLU, Semester 2

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1 First order differential equations

Let $f(x)$ be a given function of x. The solutions of the differential equation

$$y' = f(x)$$

is the indefinite integral

$$\int f(x)\,dx$$

1.1 Setting up a general differential equation

Let

$$\begin{cases} \dfrac{\mathrm{d}y}{\mathrm{d}t} = a - y \\ y(0) = 0 \end{cases}$$

General solution:

$$\boxed{y(t) = a + Ce^{-t}}$$

Particular solution:

$$y(0) = 0 = a + Ce^{-0} = a + C \qquad\qquad C = -a$$

$$\boxed{y = a - ae^{-t}}$$