18.03 Differential Equations: Week 3

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Progress Update

Over the past week we have covered:

1. The general solution of first order linear ODEs.

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For a first order linear ODE of the form

$$y' + a(x)y = f(x), \tag{1}$$

we have that for

$$u(x) = \exp(\int a(x)\,dx), y = \frac{\int u(x)f(x)\,dx + C}{u(x)}. \tag{2}$$

Example problem

Consider this example first order linear inhomogeneous ODE and associated initial value:

$$y' + y = 2;\ y(0) = 0 \tag{3}$$