

First order differential equations

The following equations can all be solved by direct integration

1. $\frac{dx}{dt} = 4 \frac{t}{x^2}$ given that $x = 4$ when $t = 1$

2. $\frac{dy}{dx} = -4x(y+4)$ given that $y = -3$ when $x = 2$

The following equations cannot be rearranged and integrated directly, but they are all equations with constant coefficients.

3. $3 \frac{dy}{dx} + 6y = 2e^{2x}$ given that $\frac{dy}{dx} = 0$ when $x = 0$

4. $\frac{dx}{dt} - 2x = 4e^{-2t}$ given that $x = 2$ when $t = 0$

5. $\frac{dx}{dt} - 2x = 5 \sin(t)$ given that $x = -1$ when $t = 0$