

Solutions

Each answer shows the steps, then the **result**.

2.1

- $\frac{1}{y} dy = \frac{1}{x} dx$

2.2

- $\ln y = 3x + c \Rightarrow y = Ae^{3x}$

3.1 B

- $\frac{dy}{dx} = ky$ gives $y = Ae^{kx}$

3.2

- $\int \frac{1}{y+1} dy = \int 2x dx; \ln(y+1) = x^2 + c; y(0) = 0 \Rightarrow c = 0; y+1 = e^{x^2}; y = e^{x^2} - 1$

3.3

(a)

- $\int h^{-1/2} dh = \int -k dt; 2\sqrt{h} = -kt + c; h = H \text{ at } t = 0 \Rightarrow c = 2\sqrt{H}; \sqrt{h} = \sqrt{H} - \frac{1}{2}kt$

(b)

- empty when $h = 0$: $0 = \sqrt{H} - \frac{1}{2}kt \Rightarrow t = \frac{2\sqrt{H}}{k}$