8. Solve the differential equation $\frac{dy}{dt} = -6y$ with the initial condition $y(1) = 4$ Check your answer.

$\int \frac{dy}{y} = \int -6\,dt$

$\ln|y| = -6t + C$

$|y| = e^{\ln|y|} = e^{-6t+C}$

$y = \pm e^{C} e^{-6t}$

Let $k = \pm e^{C}$

$y = ke^{-6t}$

$4 = y(1) = ke^{-6}$

$4e^{6} = k$

$y = 4e^{6}e^{-6t}$

$y = 4e^{6-6t}$

check

$\frac{dy}{dt} = -6(4e^{6-6t}) = -6y$ ✓

$y(1) = 4e^{6-6} = 4$ ✓

9. Solve for x: $\log_2(x+3) - \log_2 x = 2$. Check your answer.

$\log_2 \frac{x+3}{x} = 2$

So $\frac{x+3}{x} = 2^2$

$x+3 = 4x$

$3 = 3x$

$1 = x$

$\log_2(1+3) \quad \log_2 1 \quad 2-0 = 2$ ✓