

$$e^{-2t} v(t) = -4e^t + k$$

$$v(t) = ke^{2t} - 4e^{3t}$$

The general solution of the ODE is

$$y(t) = \frac{1}{v(t)} = \frac{1}{ke^{2t} - 4e^{3t}}$$

{ It can also be expressed as: $y(t) = \frac{e^{-2t}}{k - 4e^t}$. }

(ii) Use IC to find k .

$$y(0) = 1 = \frac{1}{k-4} \Leftrightarrow k-4=1 \Leftrightarrow k=5$$

The solution to the IVP is $y(t) = \frac{1}{5e^{2t} - 4e^{3t}}$.