

$$\frac{dy}{dt} = y^2 - 4y + 3$$

$$\frac{1}{(y-3)(y-1)} dy = 1 dt$$

$$\int \frac{1}{(y-3)(y-1)} dy = \int 1 dt$$

$$\hookrightarrow \frac{1}{(y-3)(y-1)} = \frac{A}{y-3} + \frac{B}{y-1}$$

$$\Rightarrow A(y-1) + B(y-3) = 1$$

$$Ay - A + By - 3B = 1$$

$$(A+B)y + (-A-3B) = 0y + 1$$

$$A+B=0 \quad -A-3B=1$$

$$A=-B \quad B-3B=1$$

$$-2B=1$$

$$B=-\frac{1}{2}$$

$$A=\frac{1}{2}$$

$$\frac{1}{2} \int \frac{1}{y-3} - \frac{1}{y-1} dy = \int 1 dt$$

$$\frac{1}{2} (\ln|y-3| - \ln|y-1|) = t + C$$

$$\frac{1}{2} \ln \left| \frac{y-3}{y-1} \right| = t + C$$

$$\ln \left| \frac{y-3}{y-1} \right| = 2t + C_1$$

$$e^{\ln \left| \frac{y-3}{y-1} \right|} = e^{2t} e^{C_1}$$

$$\frac{y-3}{y-1} = C_2 e^{2t}$$

$$y-3 = C_2 e^{2t} (y-1)$$

$$y = C_2 e^{2t} y - C_2 e^{2t} + 3$$

$$y - C_2 e^{2t} y = -C_2 e^{2t} + 3$$

$$y(1 - C_2 e^{2t}) = -C_2 e^{2t} + 3$$

$$y = \frac{-C_2 e^{2t} + 3}{-C_2 e^{2t} + 1}$$

$$y = \frac{C_3 e^{2t} + 3}{C_3 e^{2t} + 1}$$

