

Mac-Etel Golden
Mechatronics
16/ENG05/021

1a

$$\frac{dy}{dt} = ky$$

$$\int \frac{1}{y} dy = \int k dt$$

$$\ln y = kt + c$$

$$y = e^{kt+c}$$

$$y = e^{kt} \cdot e^c$$

$$\text{Let } e^c = y_0$$

$$y = y_0 \cdot e^{kt}$$

But $y = dy_0$ and $t = 5\text{hrs}$

$$dy_0 = y_0 \cdot e^{5k}$$

$$\ln d = 5k$$

$$k = \frac{\ln d}{5} = \frac{\ln 2}{5} = 0.139$$

$$y = y_0 e^{0.139t}$$

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1b

$$24 \text{ hours} = 1 \text{ day}$$

$$x = 1 \frac{1}{2} \text{ day}$$

$$x = 24 \times 1.5$$

$$x = 36 \text{ hrs}$$

where $y_0 = 20$ and $t = 36$

$$y = 20 e^{0.139 \times 36}$$

$$y = 2980.2$$