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 16/ENG06/1007
 MATHEMATICAL ENGINEERING.

ANSWER

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

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

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

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

But $y = 20$ and $t = 5$ hrs

$20 = y_0 \cdot e^{5k}$
 $\frac{dy}{dy_0} = e^{5k}$

$\ln 2 = 5k$

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

or $y = y_0 \cdot e^{0.139t}$

b) 24 hrs = 1 day

$x = 1/2$ day

$x = 24 \times 1/2 = 12$ hrs

When $y_0 = 20$ and $t = 36$

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

$y = 2080.08$

Handwritten notes at the bottom of the page, including the word "Hand" and some illegible scribbles.

A) Find the volume element

C) $\int_V \rho \, dV$

D) Kinetik

M) $\int_V \rho \, dV$

Answer

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

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

$$\ln y = kt + C$$

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

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

$$\text{let } e^C = y_0$$

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

but $y = y_0$ and $t = 0$

$$y_0 = y_0 \cdot e^{k \cdot 0}$$

$$k = \frac{\ln 2}{T}$$

$$k = \frac{\ln 2}{5} = \frac{0.693}{5} = 0.139$$

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

b) $\frac{dx}{dt} = -kx$

$$x = x_0 \cdot e^{-kt}$$

$$x = x_0 \cdot e^{-0.139t}$$

$$= 36 \text{ hrs}$$

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