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Mechatronics Engineering
16/ENG05/0360

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

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

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

$\ln y = kt + C$

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

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

Since e^{C} is also a constant it can be represented as C

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

$y = Ce^{kt}$

$\therefore$ given initial conditions

at $t = 0$ $y = 20$

$20 = Ce^{k(0)}$

$20 = Ce^{0}$

$20 = C \times 1$

$\therefore C = 20$

Our model becomes

$y = 20e^{kt}$

b) Expressing 1½ days in hours

24hr → 1day

$\therefore$ 1½ days = 36 hrs

also y doubles every 5hours $\therefore$ at $t = 5$ $y = 40$ (i.e $t = 0$, $y = 20$)

$\therefore 40 = 20e^{k(5)}$

$\frac{40}{20} = e^{5k}$