$$\frac{dy}{(y-2040)} = -0.025\,dt \Rightarrow \int \frac{dy}{(y-2040)} = \int -0.025\,dt$$

$$\int \frac{dy}{(y-2040)} = -0.025 \int dt \Rightarrow \ln(y-2040) = -0.025t + c$$

$$y - 2040 = e^{-0.025t+c} \Rightarrow y - 2040 = e^{-0.024}e^{c}$$

$$y - 2040 = e^{-0.025t} \cdot y_0 \Rightarrow y - 2040 = y_0 e^{-0.025t}$$

$$y = y_0 e^{-0.025t} + 2040 \Rightarrow \text{initially, when } t = 1,\ y = 150\text{lb}$$

$$150 = y_0 e^{-0.025t} + 2040 \Rightarrow 150 - 2040 = y_0 \times 1$$

$$y_0 = -1890$$

$$y = -1890 e^{-0.025t} + 2040$$

$$y = 2040 - 1890 e^{-0.025t}$$

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18/ENG02/091
COMPUTER ENGINEERING
ENG 282 (ENGINEERING MATHS 2)

1) Using Balance law, The acceleration rate ~~of~~ salt within a is equal to The input rate of salt into The system minor output rate of salt from The system ∴

Acceleration rate of salt within a system =,
= input rate of salt into the system
= output rate of salt from the system

let The amount of salt present in the tank at any time be 'y'

Time rate of change of $y = \frac{dy}{dt} = y_{in} - y_{out}$

If 50 gal of brine enters the tank perminute and One gallon contains (1 + sin t) lb of salt, Then

at $t = 1$, $(1 + \sin t) = (1 + \sin(1)) = 1.02 lb$

Hence the amount of salt entering into the tank is

$50 gal/min \times 1.02 lb/gal = 51 lb/min$

The tank contains 1200 gal of water with dissolved salt and 30 gal of the solution exists The tank per minute. That is $\frac{30 gal}{1200 gal} = 0.025 = 2.5\%$ of the content of the tank. So 2.5% of the salt present inside the tank will also leave the tank per minute. That is

$y_{out} = 2.5\%$ of y

a) $\frac{dy}{dt}$ lb/min = 51 lb/min − 2.5% of y lb/min

b) $\frac{dy}{dt} = 51 - 0.025y$; $\frac{dy}{dt} = -0.025y + 51$

$\frac{dy}{dt} = -0.025\left(\frac{-0.025y}{-0.025y} + \frac{51}{-0.025}\right) \} = 0.02(y - 2040)$