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1). Using 'balance law'; the acceleration rate at salt within system is equal to the input rate of salt into the system minus the is equal to the input rate of salt from the system:

Acceleration rate at Salt within a system = input rate of salt into the system

− out put rate of salt from outside the system.

Let amount of salt present in the tank at any time t' be 'y'; time rate at change

at $y = \frac{dy}{dt} = y_{in} - y_{out}$

If 50 gal of brine enters the tank per minute & one gallon contains $(1 + \sin t)$ lb of salt then

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

Hence, the amount of salt entering into the tank is 50 gal/min $\times 1.0812$ lb/gal $=$

$= 51$ lb/min

the tank containing 120 gal of water with dissolved salt and 30 gal of solution exits the tank per min is 30 gal

- 0.025 .25% - of content of the tank so 2-5% of the salt present inside. the tank will also leave the tank per min

$y \cdot r_{out} = 2.5\%$ of y

a) $\frac{dy}{dt}$ .lb/min = 5 lb/min - 25% of y lb/min

b) $\frac{dy}{dt} = 5l - 0.025y$ / $\frac{dy}{dt} = 0.025y + 5l$

$\frac{dy}{dt} = -0.025\left(\frac{-0.025 + 5l}{-0.025 \quad -0.025}\right)$ / $\frac{dy}{dt} =$

$0.02 \cdot (y - 2040)$

$\frac{dy}{(y - 2040)} = -0.025\,dt$; $\int \frac{dy}{y - 2040} = \int_{0}^{t} -0.025\,dt$

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

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

$y - 2040 = e^{-0.025t}$ y_0 ; $y - 2040 = y_0 e^{-0.025t}$

$y = y_0 e^{-0.025t}$ y_0 ; $y - 2040 = y_0 e^{-0.025t}$

$y = y_0 e^{-0.025} + 2040$, initially when $t = 1$

$y = 1501b$;

$150 = y_0 \cdot e^{-0.025t} + 2040$; $150 - 2040 = y_0$

$\times 1$

$y = -1890$

50;

$y = 7890 e^{-0.025t} + 2040 = y = 2040 + 780 e^{-0.025t}$