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L.
18/ENG06/040
Mechanical Engineering
EngineeringMathematics
II
Assignment

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Mechanical Engineering
~~ENG06~~ ENG282

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

{Accumulation rate of salt within a system} = {Input rate of salt into the system} − {Output rate of salt from System}

~~So $\frac{dy}{dt} = 50(1+\sin t) - (2.5\% \text{ of } y)$~~

So $\frac{dy}{dt} = 50(1+\sin t) - 0.025y$ (2.5% of y)

$\frac{dy}{dt} + 0.025y = 50(1+\sin t)$

$\frac{dy}{dt}\left(\frac{50}{-0.025}(1+\sin t) + \frac{0.025y}{0.025}\right) - 0.025$

$dy/dt = (y + (-2000(1+\sin t)) - 0.025$

$\frac{dy}{dt} = [y - 2000(1+\sin t)] - 0.025$

$\frac{dy}{y - 2000(\sin t)} = 0.025\,dt$

$\int \frac{dy}{y - 2000(\sin t)} = \int 0.025\,dt$

$\ln(y = 2000(1+\sin t) = -0.025t + c$

~~$(y = 2000(1+\sin t) = e^{-0.025t} \cdot e^{c})$~~

$y + 2000(1+\sin t) = e^{-0.025t + c_0}$

$y - 2000(1+\sin t) = e^{-0.025t + c}$

$y = 2000(1+\sin t) = e^{-0.025t} e^{c}$

$y - 2000(1+\sin t) = e^{0.025t} y_0$

$y - 2000(1+\sin t) = y_0 e^{-0.025t}$

$\therefore y = y_0 e^{-0.025t} + 2000(1+\sin t)$ ... ①

Salt dissolved = 150lb

Initial Salt dissolved = 150lb

So, $\therefore$ at $t = 0$

$y = 50$

Then $150 = y_0 e^{-0.025(0)} + 2000(1+\sin t)$

$150 = y_0 \cdot 1 + 2000(1+\sin t)$

$y_0 = -150 + 2000(1+\sin t)$

$y_0 = 1850$

$\therefore y_0 = -1850$ -- Sub in eqn ①

$y = -1850 \cdot e^{-0.025t} + 2000(1+\sin t)$

$\therefore y = 2000(1+\sin t) - 1850 e^{(-0.025t)}$

Using MathLAB

1 Comandwindow

2 Clear

Clc

Close all

Syms mt

ans = dsolve('Dm + 0.025*m = 50*50*sin(t)', 'm(0) = 150')

t = 0 : 0.5 : 450

tn = Subs(ans, t)

Plot(t, tn).

grid on

grid minor

xlabel('time (mins)')

Ylabel('Volume (liters)')

xlswrite('odevbesdata.xlsx', {'t (min)'}, 'veriler', 'A1')

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

{ Accumulation
{ salt within

~~$\frac{dy}{dt} = 0$~~

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

$\frac{dy}{dt}$

$\frac{dy}{dt}$

$\frac{dy}{dt}$

$\frac{dy}{dt}$

$\frac{dy}{dt}$

$\therefore \frac{dy}{dt}$

$\int$

```
xlswrite ('odevbesdata.xlsx', mins, 'veriler', 'A2')
xlswrite ('odevbesdata.xlsx', ('VCLitre'), 'veriler', 'B1')
xlswrite ('odevbesdata.xlsx', excelvalues, 'veriler', 'B2')
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Number 2.