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 181enqos10x0

1) from $dy/dt = y \ln - y \sin t$
 $dy/dt = 50C(1 + \sin t) - 2.5\% \text{ of } y$
 $y \sin t = 30 \quad \therefore 0.025$
 1000

$y \sin t = 2.5\% \text{ of } y = 1/40 y$
 $dy/dt = 50C(1 + \sin t) - 0.025y$
 by separating the variables

$dy/dt + 0.025y = 50C(1 + \sin t)$
 $\Rightarrow 1 + 0.025y dy = 50C(1 + \sin t) dt$
 $dy/dt = 50C(1 + \sin t) - 0.025y$
 $dy/dt + 0.025y = 50C(1 + \sin t)$
 Using linear equation method

$dy/dt + Py = Q$
 $P = 0.025, Q = 50C(1 + \sin t)$

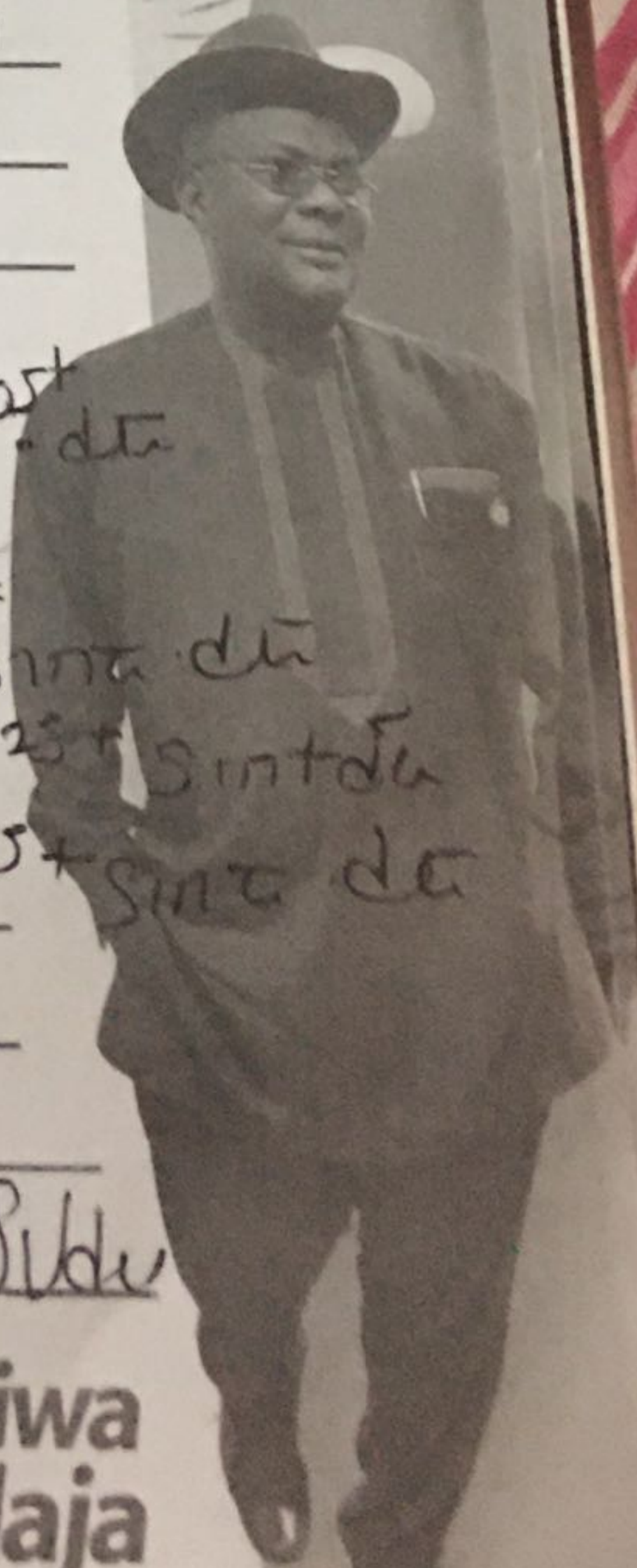
$\therefore \int P dt = 0.025t$
 $I.F = e^{\int P dt}$
 $I.F = e^{0.025t}$

$y \cdot e^{0.025t} = \int 50C(1 + \sin t) e^{0.025t} dt$
 $y \cdot e^{0.025t} = 50 \int C(1 + \sin t) e^{0.025t} dt$
 $y \cdot e^{0.025t} = 50 \int e^{0.025t} + e^{0.025t} \sin t dt$
 $y \cdot e^{0.025t} = 50 \int e^{0.025t} dt + \int e^{0.025t} \sin t dt$
 $y \cdot e^{0.025t} = 50 \frac{e^{0.025t}}{0.025} + \int e^{0.025t} \sin t dt$

Integration by parts

$\int e^{0.025t} \sin t dt$
 $u = e^{0.025t} \quad dv = \sin t$
 $du = 0.025 e^{0.025t} \quad v = -\cos t$

Solved by - Sibdu
 Otunba
Olumuyiwa
Ogunlaja



$$\int e^{0.025t} \sin t = -e^{0.025t} \cos t + 0.025 \int e^{0.025t} \cos t + C$$

$$\int u dv = uv - \int v du$$

$$u = e^{0.025t}, \quad dv = \cos t$$

$$du = 0.025 e^{0.025t}, \quad v = \sin t$$

$$= -e^{0.025t} \cos t + 0.025 \left[e^{0.025t} \sin t - \int \sin t \cdot 0.025 e^{0.025t} \right]$$

$$= -e^{0.025t} \cos t + 0.025 \left[e^{0.025t} \sin t - 0.025 \int \sin t e^{0.025t} \right]$$

$$\text{Let } Q = \int e^{0.025t} \sin t$$

$$Q = -e^{0.025t} \cos t + 0.025 \left[e^{0.025t} \sin t - 0.025 Q \right]$$

$$Q = -e^{0.025t} \cos t + 0.025 e^{0.025t} \sin t - 0.00625 Q$$

$$Q + 0.00625 Q = -e^{0.025t} \cos t + 0.025 e^{0.025t} \sin t$$

$$1.00625 Q = -e^{0.025t} (\cos t - 0.025 \sin t)$$

$$Q = \frac{-e^{0.025t}}{1.00625} (\cos t - 0.025 \sin t) + C$$

$$y = 2000 - \frac{50}{1.00625} (\cos t - 0.025 \sin t) + \frac{50C}{e^{0.025t}}$$

$$\text{When } y = 150, \quad t = 0$$

$$150 = 2000 - \frac{50}{1.00625} (1 - 0) + \frac{50C}{1}$$

$$150 = 2000 - 49.68 (1) + 50C$$

$$150 = 1950.32 + 50C$$

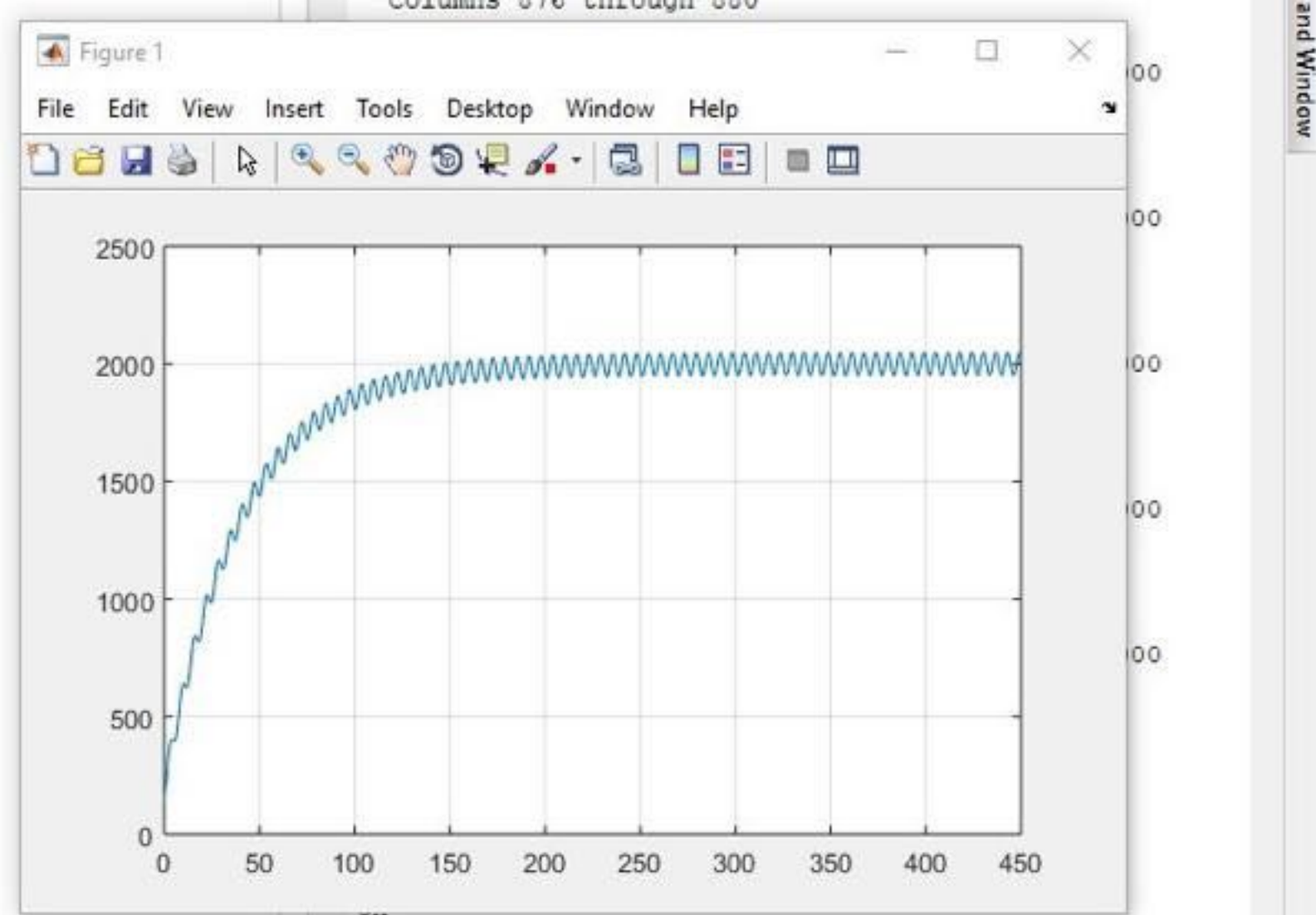
$$\frac{50C}{50} = \frac{-1800.32}{50}$$

$$C = -36.0064$$

$$Q = \frac{-e^{0.025t}}{1.00625} (\cos t - 0.025 \sin t) + C$$

$$\int e^{0.025t} \sin t = \frac{-e^{0.025t}}{1.00625} (\cos t - 0.025 \sin t) + C$$

```
1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - syms m t
6 - ans=dsolve('Dm+0.025*m=50+50*sin(t)', 'm(0)=150')
7 - t=0:0.5:450
8 - tn=subs(ans,t)
9 - plot(t,tn)
10 - grid on
```



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[ 150, 2000 - (2000*1601^(1/2)*cos(atan(1/40) + 1/2))/1.
fx >>
<
```

```

1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - syms t
6 - values=[]
7 - t=1:1:500
8 - mean=1000-((exp(-0.05*t))*800)
9 - y=1000+(50/1.0025)*sin(t)+(2.5/1.0025)*cos(t)-((exp(-0.05*t))*802.4
10
11 - if rem(t,2) ==0
12 -     values=[values,mean]
13 - else
14 -     values=[values,y]
15 - end
16 - excelvalues=transpose(values)
17 - mins=transpose(t)
18 - plot(t,values)
19 - grid on
20 - grid minor
21 - xlabel('time(mins)')
22 - ylabel('volume(litres)')
23 - xlswrite('odevbesdata.xlsx',{'t(min)'},'veriler','A1')
24 - xlswrite('odevbesdata.xlsx',mins,'veriler','A2')
25 - xlswrite('odevbesdata.xlsx',{'V(Litre)'},'veriler','B1')
26 - xlswrite('odevbesdata.xlsx',excelvalues,'veriler','B2')
27

```

