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16/ENR03/010

Civil Engineering

Eng. 282

1a) From

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

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

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

∴ By Separating the variables

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

Multiply both sides by dt

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

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

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

$$\frac{dy}{dt} = -0.02(y - 2040)$$

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

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

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

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

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

$$y = 15016$$

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

$$150 - 2040 = y_0 \times 1$$

$$y_0 = -1890$$

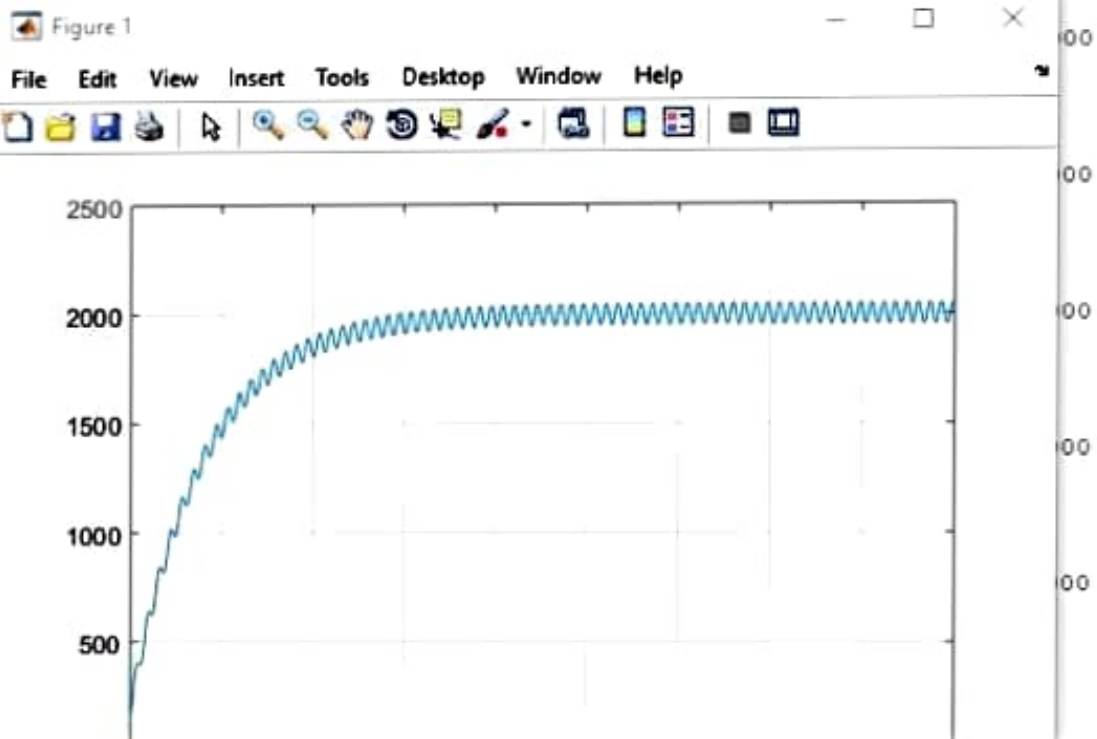
50;

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

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

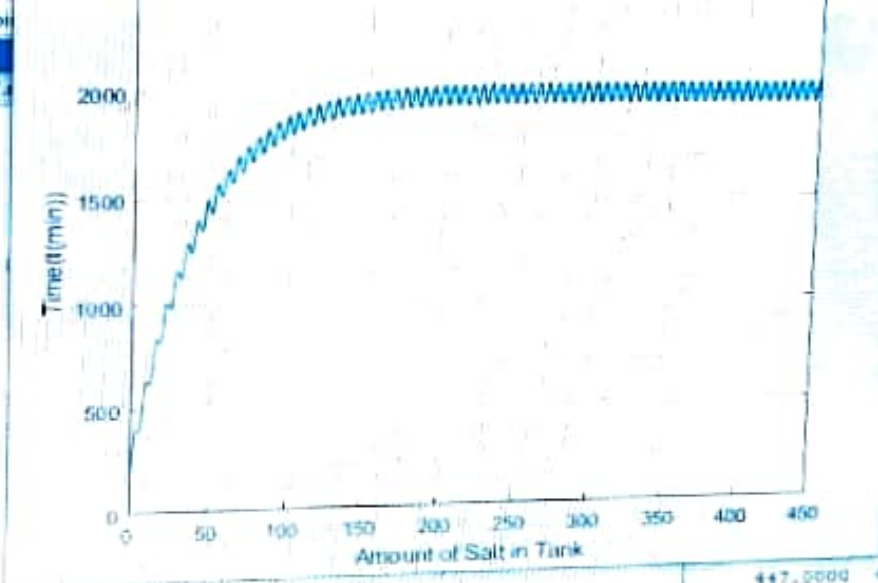
commandwindow

```
clear  
clc  
close all  
syms m t  
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
```



```

+18 eng282quiz2.m assignment5_1.m assignment5_2_1.m
1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - syms W
6 - s=dsolve('Dm - 0.5m = 1000', 'm(0)=0')
7 - tn=0:0.5:450
8 - m=subs(s, tn)
9 - plot(tn, m)
10 - grid on
11 - grid minor
12 - xlabel('Amount of Salt in Tank')
13 - ylabel('Time t (min)')
14
15
16
    
```

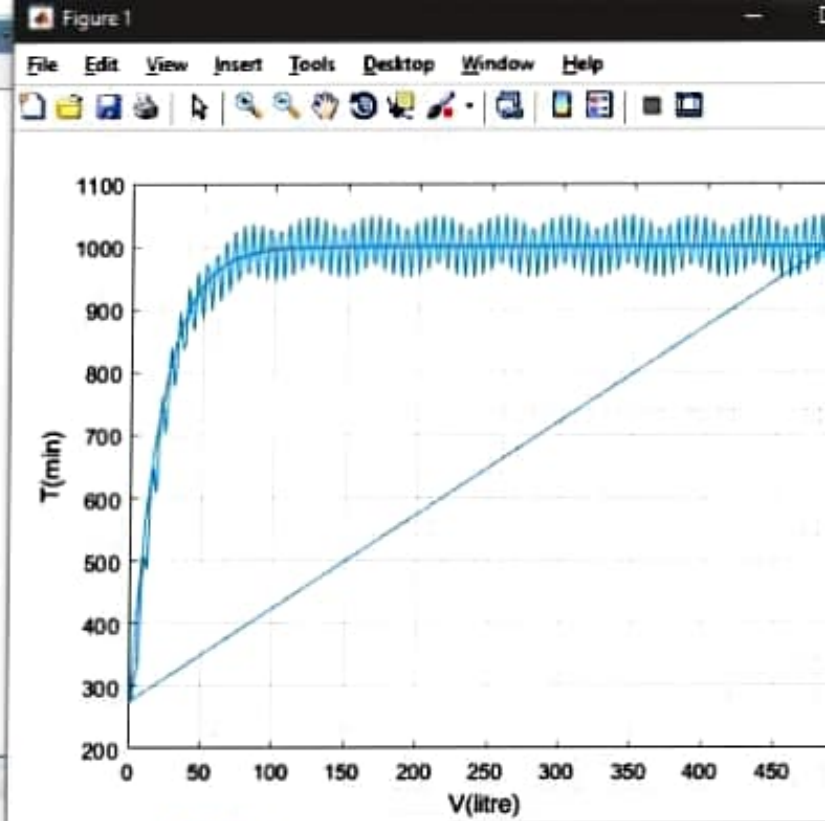


| through 876 | 876.5000 | 436.0000 | 436.1000 | 437.0000 | 437.5000 |
|--------------|-----------|----------|----------|----------|----------|
| through 882 | 882.5000 | 438.0000 | 438.2000 | 439.0000 | 439.5000 |
| through 888 | 888.5000 | 440.0000 | 440.2000 | 441.0000 | 441.5000 |
| through 894 | 894.5000 | 442.0000 | 442.2000 | 443.0000 | 443.5000 |
| through 900 | 899.5000 | 443.0000 | 443.2000 | 444.0000 | 444.5000 |
| through 906 | 905.5000 | 444.0000 | 444.2000 | 445.0000 | 445.5000 |
| through 912 | 911.5000 | 445.0000 | 445.2000 | 446.0000 | 446.5000 |
| through 918 | 917.5000 | 446.0000 | 446.2000 | 447.0000 | 447.5000 |
| through 924 | 923.5000 | 447.0000 | 447.2000 | 448.0000 | 448.5000 |
| through 930 | 929.5000 | 448.0000 | 448.2000 | 449.0000 | 449.5000 |
| through 936 | 935.5000 | 449.0000 | 449.2000 | 450.0000 | 450.5000 |
| through 942 | 941.5000 | 450.0000 | 450.2000 | 451.0000 | 451.5000 |
| through 948 | 947.5000 | 451.0000 | 451.2000 | 452.0000 | 452.5000 |
| through 954 | 953.5000 | 452.0000 | 452.2000 | 453.0000 | 453.5000 |
| through 960 | 959.5000 | 453.0000 | 453.2000 | 454.0000 | 454.5000 |
| through 966 | 965.5000 | 454.0000 | 454.2000 | 455.0000 | 455.5000 |
| through 972 | 971.5000 | 455.0000 | 455.2000 | 456.0000 | 456.5000 |
| through 978 | 977.5000 | 456.0000 | 456.2000 | 457.0000 | 457.5000 |
| through 984 | 983.5000 | 457.0000 | 457.2000 | 458.0000 | 458.5000 |
| through 990 | 989.5000 | 458.0000 | 458.2000 | 459.0000 | 459.5000 |
| through 996 | 995.5000 | 459.0000 | 459.2000 | 460.0000 | 460.5000 |
| through 1000 | 1000.0000 | 460.0000 | 460.2000 | 461.0000 | 461.5000 |

```

Editor - C:\Users\Seyitan\Documents\MATLAB\assignment5_2_1.m
19  excelmatlab.m  onlineclassradioactivity.m  eng282quiz2.m  assignment5_1.m  assignment5_2_1.m
1  -  commandwindow
2  -  clear
3  -  clc
4  -  close all
5  -  ta=2:2:500
6  -  tb=1:2:500
7  -  y=(50/0.05)+((50/1.0025)*sin(tb))+((50*0.05)/(1.0025))*cos(tb)-802.49*exp(-0.05*tb)
8  -  ym=1000-(800*exp(-0.05*te))
9  -  yg=[y ym]
10 -  tg=[ta tb]
11 -  plot (tg,yg)
12 -  grid on
13 -  grid minor
14 -  xlabel ('V(litre)')
15 -  ylabel ('T(min)')
16 -  col_header={'t (min)', 'v (litre)'}
17 -  xlswrite('C:\Users\Seyitan\Documents\MATLAB\odevbeaddata.xlsx', [tg(:), yg(:)], 'veriler', 'A2')
18 -  xlswrite('C:\Users\Seyitan\Documents\MATLAB\odevbeaddata.xlsx', col_header, 'veriler', 'A1')

```



Current Folder

| Name | Value |
|-----------|-------|
| workspace | |

1x2 cell array

```

('t (min)'  'v (litre)')

```