LEGHEMO SOLOMON
18/ENG08/010
BIOMEDICAL ENGINEERING
ENGINEERING MATHEMATICS
ENG 282

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

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

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

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

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

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

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

We Use Linear equation Method;

$\frac{dy}{dx} + Py = Q$

$\therefore P = 0.025,\ Q = 50(1+\sin t)$

$\therefore \int P.dt = 0.025t$

$= e^{\int P.dt}$

$= e^{0.025t}$

$\therefore y * IF = \int Q I.F.\, dt$

$ye^{0.025t} = \int 50(1+\sin t)e^{0.025t}\, dt$

$ye^{0.025t} = 50\int (1+\sin t)e^{0.025t}\, dt$

$ye^{0.025t} = 50\int e^{0.025t} + e^{0.025t}\sin t \cdot dt$

$ye^{0.025t} = 50\int e^{0.025t}.dt + \int e^{0.025t}\sin t.dt$

$$ye^{0.025t} = 50 \cdot \frac{e^{0.025t}}{0.025} + \int e^{0.025t} \sin t \, dt$$

$$\int e^{0.025t} \sin t \, dt$$

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

$du = 0.025e^{0.025t}$ $\quad v = -\cos t$

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

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

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

Using Integration by part,

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

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

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

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

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

let $Q = \int e^{0.025t} \sin t$.

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

$$Q = -e^{0.025t} \cos t + 0.025\, e^{0.025t} \sin t - 6.25^{-4} Q.$$

$$Q + 6.25^{-4} Q = e^{0.025t} \cos t + 0.025e^{0.025t}$$

$$Q\, 0.000625Q = -e^{0.025t} \cos t + 0.025\, e^{0.025t}$$

$$1.000625Q = -e^{0.025t} \cos t + 0.025\, e^{0.025t}$$

$$1.000625\, Q = -e^{0.025t} (\cos t - 0.025)$$

$$Q = \frac{-e^{0.025t}}{1.000625} (\cos t - 0.025) + C$$

$$Q = \frac{-e^{0.025t}}{1.000625}(\cos t - 0.025) + C$$

$$\int e^{0.025t} \sin t = \frac{-e^{0.025t}}{1.000625}(\cos t - 0.025) + C$$

$$\int e^{0.025t} \sin t = \frac{-e^{0.025t}}{1.000625}(\cos t - 0.025) + C$$

$$\therefore ye^{0.025t} = 50\left[\frac{e^{0.025t}}{0.025} - \frac{e^{0.025t}}{1.000625}(\cos t - 0.025) + C\right]$$

$$ye^{0.025t} = 2000e^{0.025t} - 50\cdot\frac{e^{0.025t}}{1.000625}(\cos t - 0.025) + 50C$$

$$y = 2000 - \frac{50}{1.000625}(\cos t - 0.025) + \frac{50C}{e^{0.025t}}$$

$$y = 2000 - \frac{50}{1.000625}(\cos t - 0.025\sin t) + \frac{50C}{e^{0.025t}}$$

when $y = 150$

$t = 0$

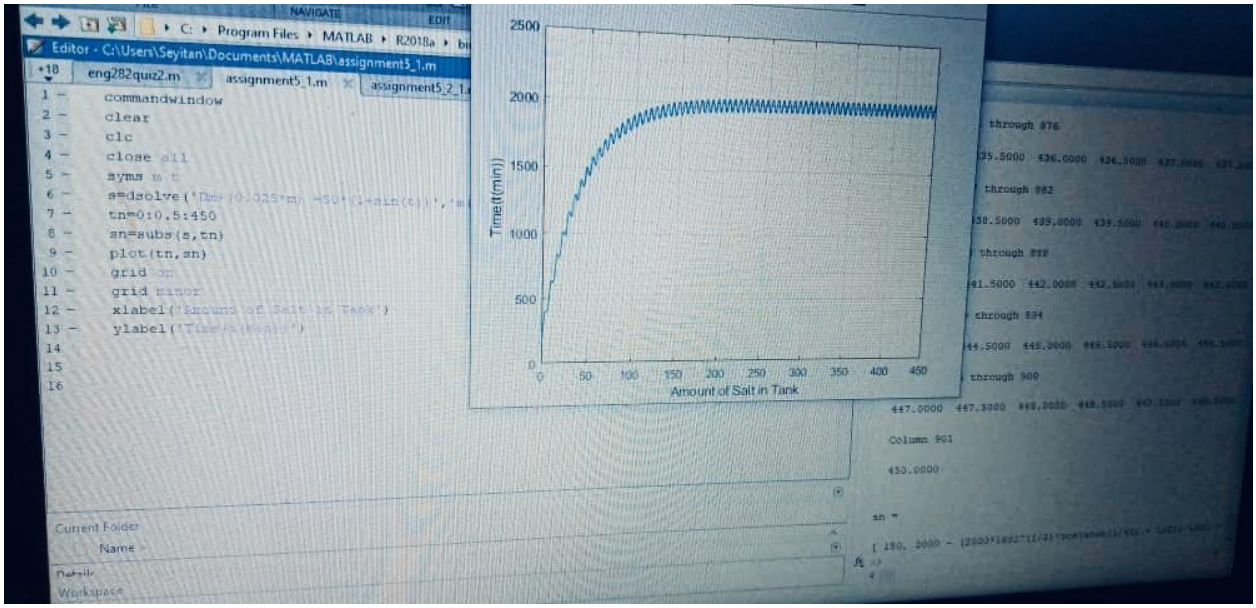
$$150 = 2000 - \frac{50}{1.000625}(1 - 0) + \frac{50C}{1}$$

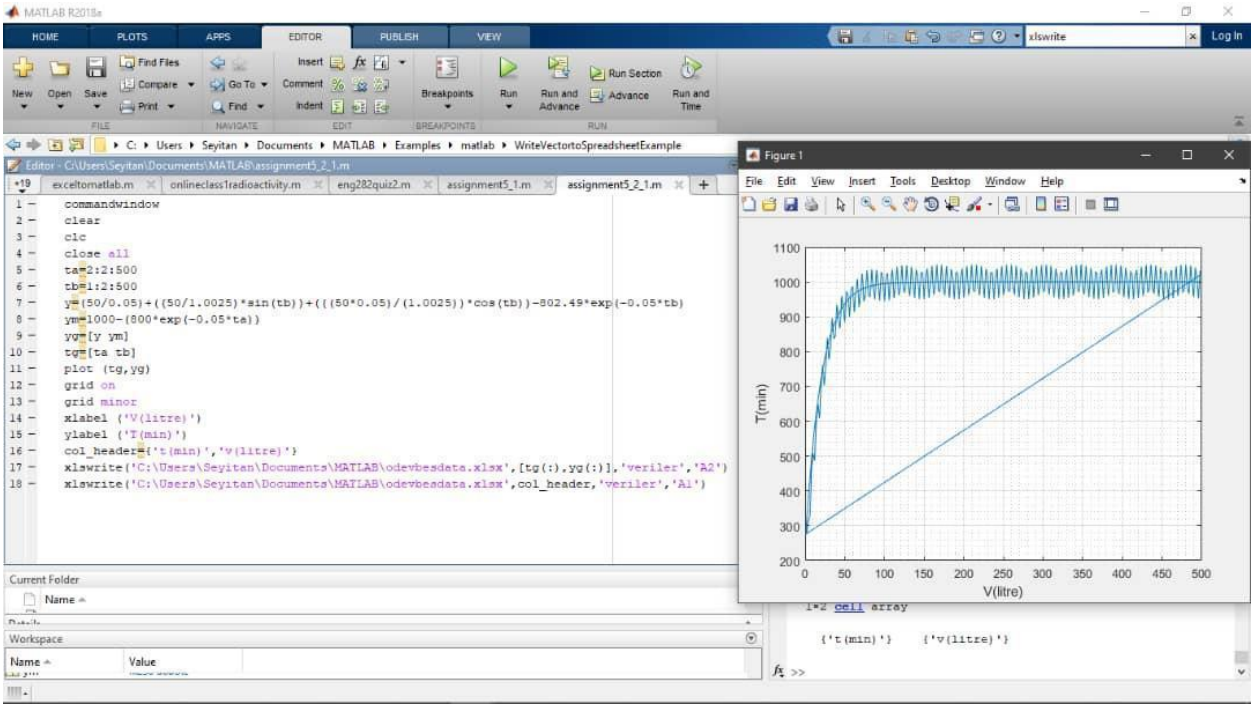
$$150 = 2000 - 49.968(1) + 50C$$

$$150 = 1950.032 + 50C$$

$$-1800.032 = 50C$$

$$C = -36.00064.$$


Editor - C:\Users\Seyitan\Documents\MATLAB\assignment5_1.m
eng282quiz2.m
assignment5_1.m
1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - syms m t
6 - s=dsolve('Dm=(0.025*m)-50*(1+sin(t))','m
7 - tn=0:0.5:450
8 - sn=subs(s,tn)
9 - plot(tn,sn)
10 - grid on
11 - grid minor
12 - xlabel('Amount of Salt in Tank')
13 - ylabel('Time(min)')
Time(t(min))
Amount of Salt in Tank
Current Folder
Name
Workspace


MATLAB R2018a
HOME
PLOTS
APPS
EDITOR
PUBLISH
VIEW
xlswrite
Log In
New
Open
Save
Find Files
Compare
Print
Go To
Find
Insert
Comment
Indent
Breakpoints
Run
Run and Advance
Run Section
Advance
Run and Time
C: ▸ Users ▸ Seyitan ▸ Documents ▸ MATLAB ▸ Examples ▸ matlab ▸ WriteVectortoSpreadsheetExample
Editor - C:\Users\Seyitan\Documents\MATLAB\assignment5_2_1.m
exceltomatlab.m
onlineclass1radioactivity.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*ta))
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\odevbesdata.xlsx',[tg(:),yg(:)],'veriler','A2')
18 xlswrite('C:\Users\Seyitan\Documents\MATLAB\odevbesdata.xlsx',col_header,'veriler','A1')
Figure 1
File Edit View Insert Tools Desktop Window Help
T(min)
V(litre)
1100
1000
900
800
700
600
500
400
300
200
0 50 100 150 200 250 300 350 400 450 500
Current Folder
Name
Workspace
Name
Value
1*2 cell array
{'t(min)'} {'v(litre)'}
>>