Ahmed Fawwaz Abiola

16/ENG06/004

Mechanical Engineering

ENG 262

Assignment

~~$V = (0.5t^2 - 8t)$~~

1200 L gal of water in tank

150 lb of salt initially dissolved

50 gal of brine

Each gallon Contains $(1+\sin t)$ lb of dissolved salt

$$\left\{\begin{matrix}\text{Accumulation rate} \\ \text{within a system}\end{matrix}\right\} = \left\{\begin{matrix}\text{input rate into} \\ \text{the system}\end{matrix}\right\} - \left\{\begin{matrix}\text{output rate} \\ \text{from the system}\end{matrix}\right\}$$

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

$$y_{in} = 50(1+\sin t) \text{ lb/min}$$

$$y_{out} = \frac{30m}{1200} \text{ lb/min}$$

$$\frac{dm}{dt} = 50(1+\sin t) \text{ lb/min} - \frac{30m}{1200} \text{ lb/min}$$

$$\frac{dm}{dt} + \frac{30m}{1200} = 50(1+\sin t)$$

$$\frac{dm}{dt} + \frac{1}{40}m = 50(1+\sin t)$$

~~I.f e~~

$$e^{\int 1/4\sigma\, dt} = e^{\frac{1}{4\sigma} t}$$

$$m \cdot e^{1/4\sigma t} = 50\int (1+\sin t)\,(e^{1/4\sigma t})$$

~~Solvin:~~

$$\int e^{1/4\sigma t} + \int \sin t\, e^{1/4\sigma t}$$

$$\int \sin t\, e^{1/4\sigma t}$$

$$v = \sin t, \quad dv = e^{1/4\sigma t}$$

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

$$\frac{dy}{dt} = \cos t \qquad \int dv = \int e^{1/4\sigma t}$$

$$v = 4\sigma e^{1/4\sigma t}$$

$$= (\sin t)\,(4\sigma e^{1/4\sigma t}) - \int (4\sigma e^{1/4\sigma t})\,(\cos t)$$

$$\int (\sin t)\,(e^{1/4\sigma t}) = I$$

$$(\sin t \times 4\sigma e^{1/4\sigma t}) - \int (4\sigma e^{1/4\sigma t})\,(\cos t)$$

$$(\sin t)(4e^{1/4t}) - 4[(\cos t)(4e^{1/4t}) + \int (4e^{1/4t})(\sin$$

$$I = (\sin t)(4e^{1/4t}) - 4[(\cos t)(4e^{1/4t}) + \int (4e^{1/4t})(\sin t)$$

$$I + 1600I = (\sin t)(4e^{1/4t}) - 4[(\cos t)(4e^{1/4t}]$$

$$-160I = (\sin t)(4e^{1/4t}) - 4[(\cos t)(4e^{1/4t}]$$

$$-1601I = (\sin t)(4e^{1/4t}) = 1600e^{1/4t}\cos t$$

$$I = \frac{(\sin t)(4e^{1/4t}) - 1600e^{1/4t}(\cos t)}{1601}$$

$$50I = \frac{50(\sin t)(4e^{1/4t}) - 80000e^{1/4t}(\cos t)}{1601} + 50C$$

$$50\int e^{1/4t} = 2000e^{1/4t} \qquad C = -19950.03$$

$$n = e^{1/4t} = 2000e^{1/4t} + 50I$$

$$n = 2000 + \frac{50I}{e^{1/4t}}$$

$$= 2000 + \frac{-80000}{1601} + C +$$

$$\frac{80,000}{1601} + C \qquad Q =$$

$-1850 = -1850 \times e^{-0.025t} + 2000$

$m = -1850e^{-0.025t} + 2000$

$m = 2000 - 1850e^{-0.025t}$

$$m(t) = 2000 + \frac{2000\sin t}{1601} - \frac{60000\cos t}{1601} - \frac{1800.03}{e^{1/40}t}$$

MATLAB R2017a

HOME | PLOTS | APPS | EDITOR | PUBLISH | VIEW

Search Documentation | 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

FILE | NAVIGATE | EDIT | BREAKPOINTS | RUN

C: ▸ Program Files ▸ MATLAB ▸ R2017a ▸ bin ▸

Current Folder

Name

- worker.bat
- mw_mpiexec.bat
- mexutils.pm
- mexsetup.pm
- mexext.bat
- mex.pl
- mex.bat
- mcc.bat
- mbuild.bat
- matlab.exe
- lcdata_utf8.xml
- lcdata.xsd
- lcdata.xml
- deploytool.bat
- win64

Details

Workspace

Name	Value
ans	1x1 sym
m	1x1 sym
t	1x901 double
tn	1x901 sym

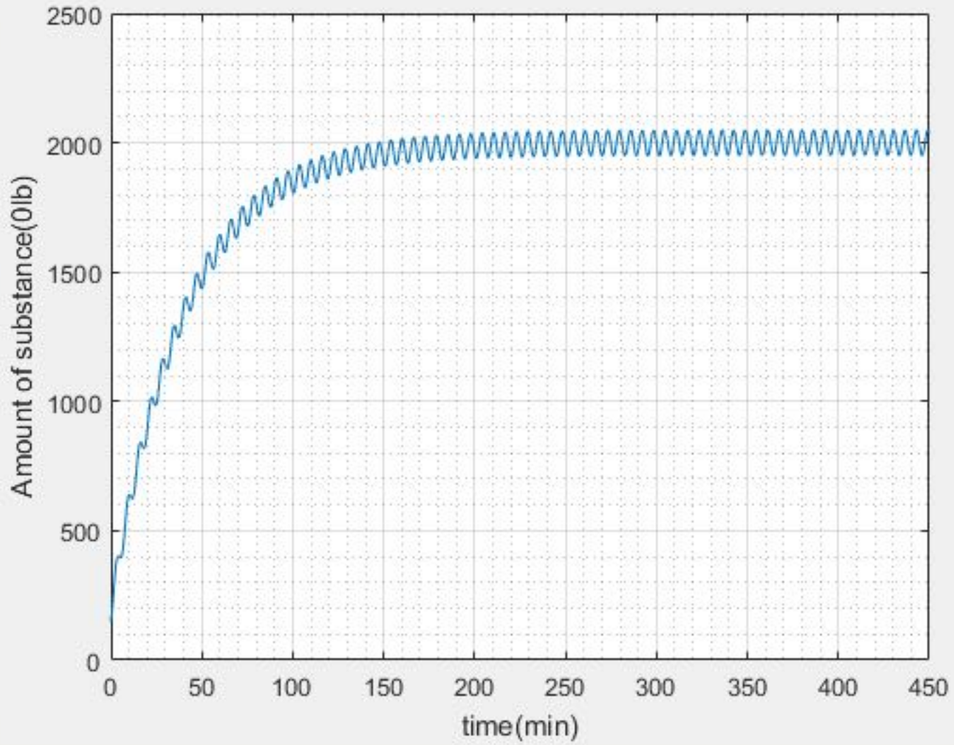
Editor - C:\Users\AHMED\Documents\MATLAB\shewunmodellingassignment.

ahmedfawwazmodellingassignment2.m | shewunmodellingassignment

```
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
11 -  grid minor
12 -  xlabel('time(min)')
13 -  ylabel('Amount of substance(0lb)')
```

Figure 1

File Edit View Insert Tools Desktop Window Help



Command Window

New to MATLAB? See resources for Getting Started.

```
tn =

[ 150, 2000 - (2000*1601^(1/2)*cos(atan(1/40) + 1/2))/1601 - (2881850*exp(-1/80))/1601, 2000 - (2000*1601^(1/2)*cos(atan(1
>>
```

Search the web and Windows

2:48 PM
5/6/2020

MATLAB R2017a

HOME | PLOTS | APPS | EDITOR | PUBLISH | VIEW

Search Documentation | 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

FILE | NAVIGATE | EDIT | BREAKPOINTS | RUN

C: ▸ Program Files ▸ MATLAB ▸ R2017a ▸ bin ▸

Current Folder

Name

- worker.bat
- mw_mpiexec.bat
- mexutils.pm
- mexsetup.pm
- mexext.bat
- mex.pl
- mex.bat
- mcc.bat
- mbuild.bat
- matlab.exe
- lcdata_utf8.xml
- lcdata.xsd
- lcdata.xml
- deploytool.bat
- win64

Details

Workspace

Name	Value
a	501x1 double
b	501x1 double
c	500
d	501x2 double
mdata1	'odevbesdata.xlsx'
mdata2	'veriler'

Editor - C:\Users\AHMED\Documents\MATLAB\abiolamodellingassignment.m

ahmedfawwazmodellingassignment2.m | shewunmodellingassignment.m | abiolamodellingassignment.m

```
16 -    d=[a b];
17 -    grid on
18 -    grid minor
19 -    xlabel('Time(min)')
20 -    ylabel('Volume(litres)')
21 -    title('Dynamic model')
22 -    mdata1=('odevbesdata.xlsx')
23 -    mdata2=('veriler');
24 -    xlswrite(mdata1,'t(min)',mdata2,'M1')
25 -    xlswrite(mdata1,'v(litre)',mdata2,'N1')
26 -    xlswrite(mdata1,M,mdata2,'M1')
27      function Yo=Y(t)
28 -    Yo=50/0.05 + (50/1.0025)*sin(t) + 50*(0.05*cos(t))/1.0025 - 802.49*exp(-0.05*t);
29 -    end
30      function Ymo=Ym(t)
31 -    Ymo=1000 - 800*exp(-0.05*t);
32 -    end
```

Command Window

New to MATLAB? See resources for Getting Started.

```
Help File: xlmain11.chm
Help Context ID: 0

Error in abiolamodellingassignment (line 24)
xlswrite(mdata1,'t(min)',mdata2,'M1')

>>
```

Y | Ln 26 | Col 18

Search the web and Windows

3:52 PM
5/6/2020

MATLAB R2017a

HOME | PLOTS | APPS | EDITOR | PUBLISH | VIEW

Search Documentation | 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

FILE | NAVIGATE | EDIT | BREAKPOINTS | RUN

C: ▸ Program Files ▸ MATLAB ▸ R2017a ▸ bin ▸

Current Folder

Name

- worker.bat
- mw_mpiexec.bat
- mexutils.pm
- mexsetup.pm
- mexext.bat
- mex.pl
- mex.bat
- mcc.bat
- mbuild.bat
- matlab.exe
- lcdata_utf8.xml
- lcdata.xsd
- lcdata.xml
- deploytool.bat
- win64

Details

Workspace

Name	Value
a	501x1 double
b	501x1 double
c	500
d	501x2 double
mdata1	'odevbesdata.xlsx'
mdata2	'veriler'

Editor - C:\Users\AHMED\Documents\MATLAB\abiolamodellingassignment.m

ahmedfawwazmodellingassignment2.m | shewunmodellingassignment.m | abiolamodellingassignment.m

```
1  -    commandwindow
2  -    clear
3  -    clc
4  -    a=[0:1:500];
5  -    b=[];
6  -    for c=a
7  -        if(mod(c,2)==0)
8  -            b=[b, Y(c)];
9  -        else
10 -            b=[b, Ym(c)];
11 -        end
12 -    end
13 -    plot(a,b)
14 -    b=b';
15 -    a=a';
16 -    d=[a b];
17 -    grid on
```

Command Window

New to MATLAB? See resources for Getting Started.

```
Help File: xlmain11.chm
Help Context ID: 0

Error in abiolamodellingassignment (line 24)
xlswrite(mdata1,'t(min)',mdata2,'M1')

fx >>
```

Y | Ln 26 | Col 18

Search the web and Windows

3:52 PM
5/6/2020

Figure 1

File Edit View Insert Tools Desktop Window Help