FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW Sign in

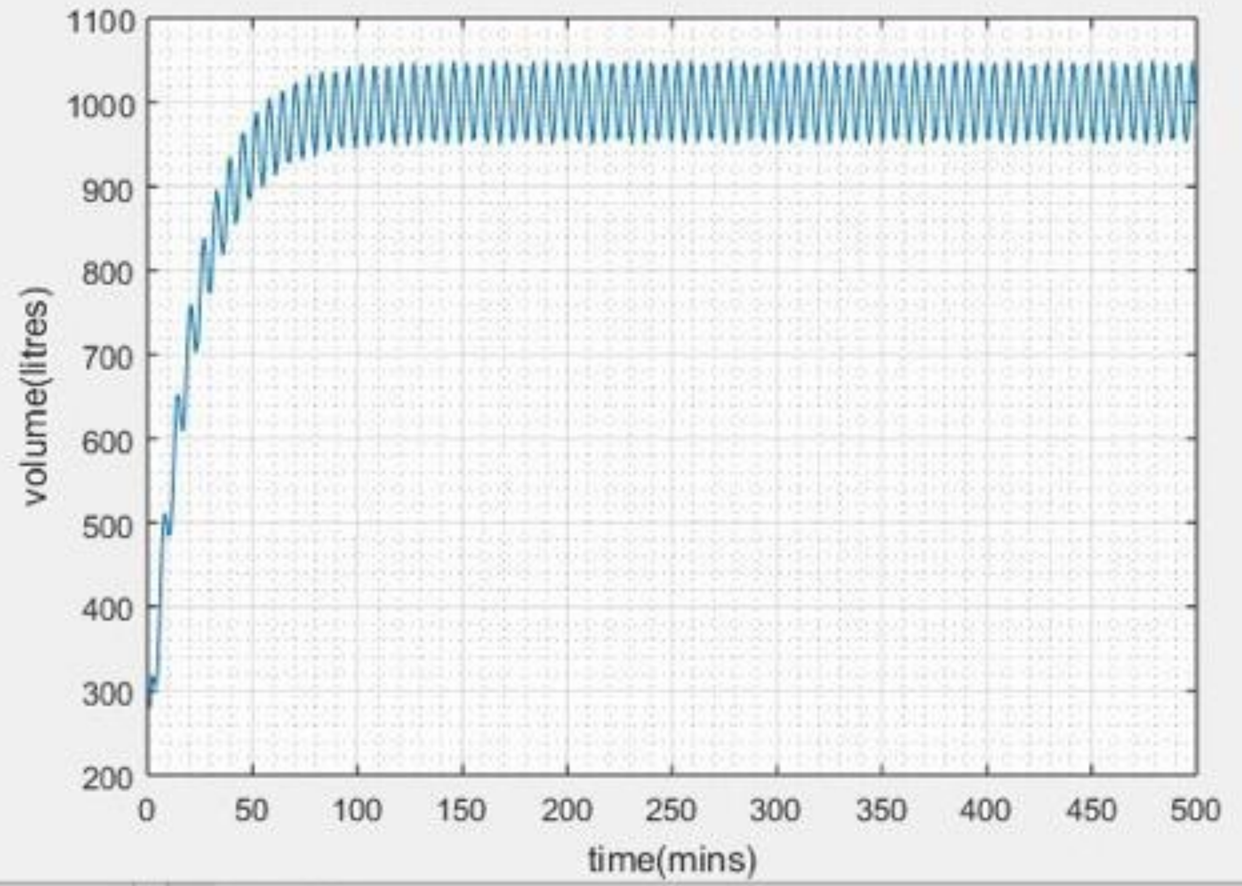
B2 279.963914100068

	A	B
1	t(min)	V(Litre)
2	1	279.9639
3	2	318.1907
4	3	313.8601
5	4	303.601
6	5	327.9009
7	6	393.9593
8	7	469.1423
9	8	511.0566
10	9	506.5922
11	10	484.0395
12	11	487.1398
13	12	534.9268
14	13	604.2824
15	14	651.2431
16	15	651.4694
17	16	622.6706
18	17	608.3676
19	18	637.9229
20	19	699.585
21	20	751.3315
22	21	759.541
23	22	729.9392
24	23	702.3679
25	24	714.1865
26	25	765.9535
27	26	820.9421
28	27	838.9333
29	28	813.2194
30	29	776.7953

```
commandwindow
clear
clc
close all
syms t
values=[]
t=1:1:500
mean=1000-((exp(-0.05*t))*800)
y=1000+(50/1.0025)*sin(t)+(2.5/1.0025)*cos(t)-((exp(-0.05*t))*802.

if rem(t,2) ==0
    values=[values,mean]
else
    values=[values,y]
end
excelvalues=transpose(values)
mins=transpose(t)
plot(t,values)
grid on
grid minor
xlabel ('time(mins)')
ylabel('volume(litres)')
xlswrite('odevbesdata.xlsx',{'t(min)'},'veriler','A1')
xlswrite('odevbesdata.xlsx',mins,'veriler','A2')
xlswrite('odevbesdata.xlsx',{'V(Litre)'},'veriler','B1')
xlswrite('odevbesdata.xlsx',excelvalues,'veriler','B2')
```

File Edit View Insert Tools Desktop Window Help




```
498
499
500
fx >>
```

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18/ENG 06 1066
Mechanical Engineering
ENG 282 (Engineering Maths II)

i Using "Balance law" The acceleration rate of salt within a system is equal to the input rate of salt into the system minus the output rate of salt within a system = Input rate of salt into the system
− Output rate of salt from the system
Let the amount of salt present in the tank at any time "t" be "y". Time rate of change of $y = \frac{dy}{dt} = y_{in} - y_{out}$

If 50 gal of brine enters the tank per minute & one contains $(1+\sin t)$ lb of salt, then at $t = 1$, $(1+\sin t) = (1+\sin(1)) = 1.02$ lb
Hence, the amount of salt entering into the tank is 50 gal/min × 1.02 lb/gal = 51 lb/min
The tank contains 1200 gal of water with dissolved salt and 30 gal of the addition exits the tank per min i.e. $\frac{30 gals}{1200 gal} = 0.025 = 25\%$
of the content of the tank, so 2.5% of the salt present inside the tank will also leave the tank per minute i.e. $y_{out} = 2.5\%$ of y

a $\frac{dy}{dt}$ lb/min = 51 lb/min − 2.5% of y lb/min

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

$\frac{dy}{dt} = -0.025\left(\frac{-0.025y}{-0.025y} + \frac{51}{-0.025}\right)$; $\frac{dy}{dt} = -0.025(y - 2040)$

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

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

$y - 2040 = e^{-0.025t+c}$; $y - 2040 = e^{-0.024} e^{c}$

$y - 2040 = e^{-0.0025t}$ y_0 ; $y - 2040 = y_0 e^{-0.025t}$

$y = y_0 e^{-0.0025t} + 2040$; Intially when $t = 1$, $y = 150$ lbs

$150 = y_0 e^{-0.0025t} + 2040$, ∴ $150 - 2040 = y_0 \times 1$

$y_0 = -1890$

So;

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

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