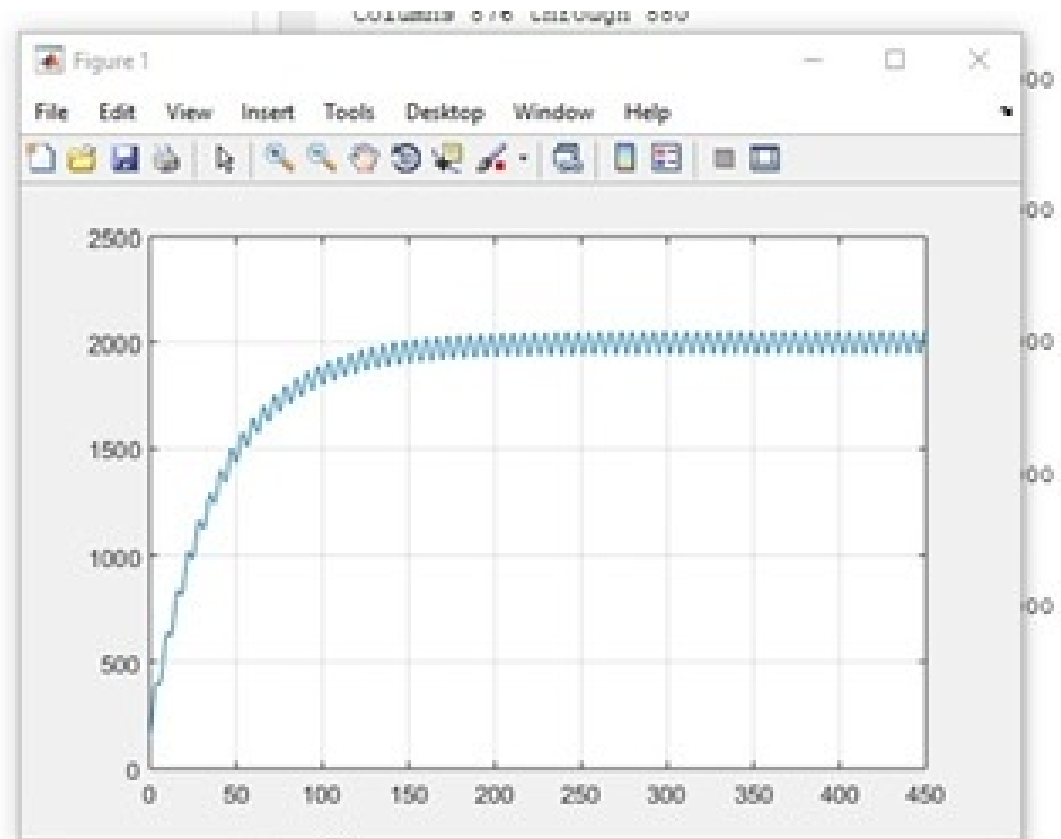


```

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

```



```

[ 150, 2000 - (2000*1401^(1/2))*cos(atan(1/40) + 1/2)]/1
>>
<

```

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

$$M_{in} = 50 \text{ gellin} \times (1 + \sin t) \text{ lb/hr}$$

$$M_{out} = \frac{30}{1200} = 0.025 = 2.5\% \text{ of } M = \frac{1}{40} m$$

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

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

$$\frac{dm}{dt} + Pm = Q$$

$$P = \frac{1}{40} \quad Q = 50(1 + \sin t)$$

$$I.F. = e^{\int P dt} = e^{\int \frac{1}{40} dt} = e^{t/40}$$

$$m \cdot e^{t/40} = \int 50(1 + \sin t) \cdot e^{t/40} dt$$

$$m \cdot e^{t/40} = 50 \int e^{t/40} + \sin t e^{t/40}$$

$$m \cdot e^{t/40} = 50 \int e^{t/40} + \int \sin t e^{t/40}$$

Integrate part

$$u = \sin t \quad dv = e^{t/40}$$

$$\frac{du}{dt} = \cos t \quad v = \int e^{t/40}$$

$$dv = \cos t dt \quad v = 40 e^{t/40}$$

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

$$\int e^{t/40} \sin t = 40e^{t/40} \sin t - \int 40e^{t/40} \cos t dt$$

$\downarrow$   
 integrate by parts  
 $u = 40e^{t/40} \quad dv = \cos t$   
 $du = e^{t/40} dt \quad v = \sin t$   
 $1600e^{t/40} \cos t + \int 1600e^{t/40} \sin t dt$

$$40e^{t/40} \sin t - (1600e^{t/40} \cos t + 1600 \int e^{t/40} \sin t dt)$$

$$\int e^{t/40} \sin t = 40e^{t/40} \sin t - 1600e^{t/40} \cos t - 1600 \int e^{t/40} \sin t dt$$

$$1600 \int e^{t/40} \sin t dt = 40e^{t/40} \sin t - 1600e^{t/40} \cos t$$

$$\int e^{t/40} \sin t dt = \frac{40e^{t/40} \sin t - 1600e^{t/40} \cos t}{1601}$$

Solving  $\int e^{t/40} dt$

$$u = t/40$$

$$\frac{du}{dt} = \frac{1}{40}$$

$$dt = 40 du$$

$$40 \int e^u du = 40e^u$$

$$50 \left( \frac{40 e^{t/40} \text{ sat} - 1600 e^{t/40} \text{ sat} + 40 e^{t/40}}{1601} \right) + C$$

$$\frac{2000 e^{t/40} \text{ sat} - 80000 e^{t/40} \text{ sat} + 2000 e^{t/40}}{1601}$$

$$\frac{2000 e^{t/40} (\text{sat} - 40 \text{ sat} + 1601)}{1601} + C$$

$$M \cdot e^{t/40} = \frac{2000 e^{t/40} (\text{sat} - 40 \text{ sat} + 1601)}{1601} + C$$

$$M = \frac{2000 e^{t/40} (\text{sat} - 40 \text{ sat} + 1601)}{1601 e^{t/40}} + \frac{C}{1601 e^{t/40}}$$

$$m = \frac{2000 (\text{sat} - 40 \text{ sat} + 1601)}{1601} + \frac{C}{1601 e^{t/40}}$$

at  $t=0$ ;  $m=150$

$$150 = \frac{2000 (\text{sat} - 40 \text{ sat} + 1601)}{1601} + \frac{C}{e^{0/40}}$$

$$150 = \frac{2000 (\text{sat} - 40 \text{ sat} + 1601)}{1601} + \frac{C}{e^{0/40}}$$

$$150 = \frac{2000 (\text{sat} - 40 \text{ sat} + 1601)}{1601} + \frac{C}{e^{0/40}}$$

$$C = 1500 - \frac{200 (\text{sat} - 40 \text{ sat} + 1601)}{1601}$$

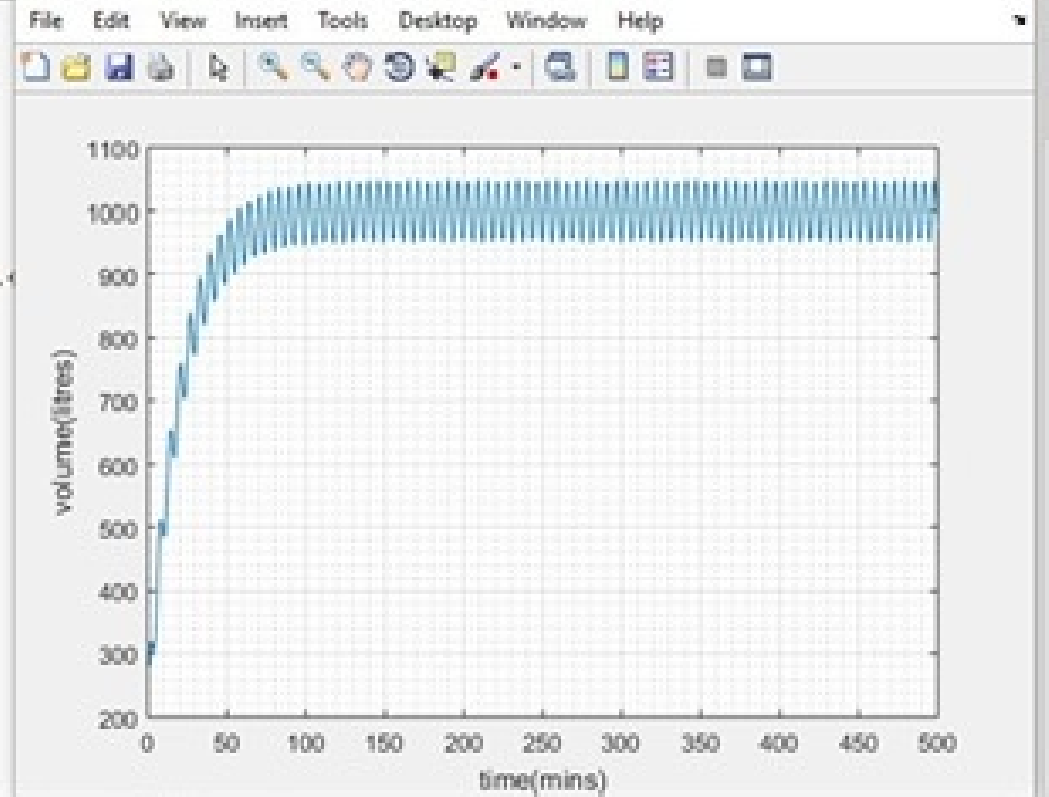
$$C = -1800.03$$

$$m = \frac{2000 (\text{sat} - 40 \text{ sat} + 1601)}{1601} - 1800.03$$

```

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

```



498  
499  
500

fx >>



B2 279.963914100068

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	t(min)	V(Litre)																			
2		1 279.9639																			
3		2 318.1907																			
4		3 311.8601																			
5		4 301.601																			
6		5 327.9009																			
7		6 351.5551																			
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		13 654.2824																			
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		23 782.3679																			
25		24 714.1863																			
26		25 765.9535																			
27		26 820.9421																			
28		27 838.9313																			
29		28 813.2194																			
30		29 736.7951																			