MATLAB R2018a

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atthehouse.m | lastminute.m

```
1 -    commandwindow
2 -    clear
3 -    clc
4 -    clear all
5 -    syms t m
6 -    t=0:0.25:450
7
8 -    soln=dsolve('Dm=50 + 50*sin(t)-0.025*t','m(0)=1000','t')
9 -    pretty(soln)
10 -   fplot(soln,t)
```

Command Window | Workspace

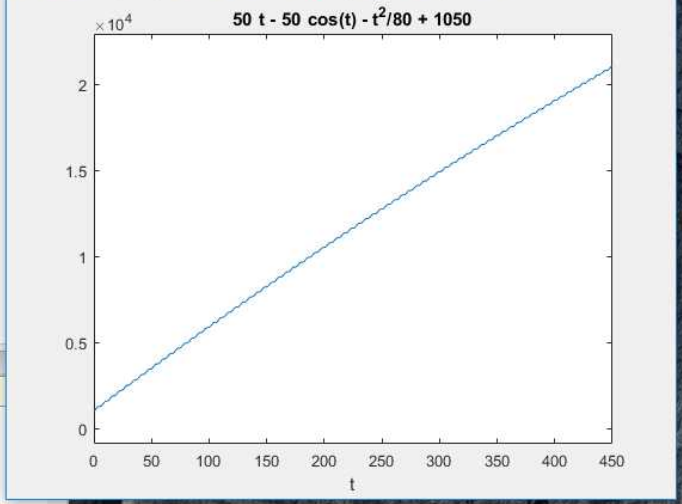
New to MATLAB? See resources for Getting Started.

```
   450.0000


soln =

50*t - 50*cos(t) - t^2/80 + 1050

                    2
                   t
50 t - 50 cos(t) - -- + 1050
                   80
```

script | Ln 10 Col 5

Figure 1

File Edit View Insert Tools Desktop Window Help



MATLAB R2018a

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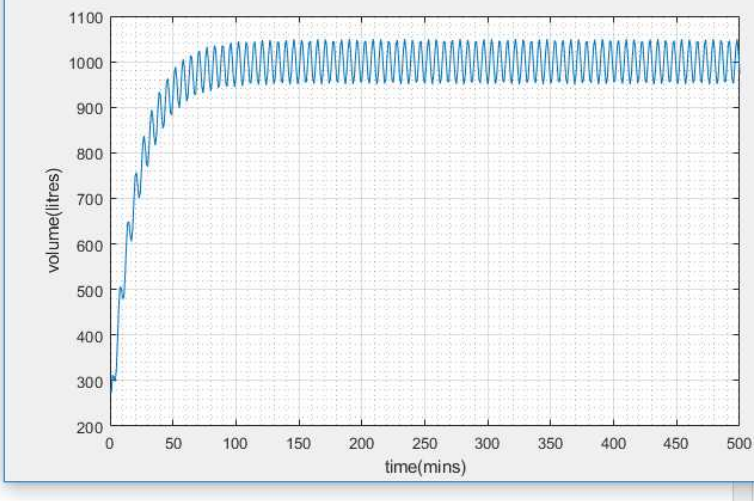
Editor - C:\Users\me\Documents\MATLAB\lastminute.m

atthehouse.m | whatever.m | lastminute.m

```
1  commandwindow
2  clear
3  clc
4  clear 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)- (809.49*exp(-0.05*t));
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')
```

Figure 1

File Edit View Insert Tools Desktop Window Help



Command Window | Workspace

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```
490
491
492
493
```

script Ln 8 Col 32

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

CHARLES-AMA CHREE PRINCE HIBIOKPOM
15/ENG04/0244
ELEC1/ELEC1

Gallon of water = 7200 gal
Amount of salt dissolved initially = 150 lb
Initial rate of brine = 50 gal/lb
Output rate of mixture = 30 gal/min

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

$$m_{in} = 50\,gal \times (1 + \sin t)$$
$$= 50(1 + \sin t)\ lb/min$$

$$m_{out} = \frac{30}{1200} = 0.025\,m$$

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

$$\frac{dm}{dt} + 0.025m = 50(1 + \sin t)$$

Using integrating factor $(dy/dx + Py = Q)$

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

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

$\int P\,dt = \int 0.025\,dt = 0.025t$

$If = e^{\int P dt} = e^{0.025t}$

$m \cdot If = \int Q \cdot If\,dt$

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

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

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

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

$\int \sin t$ Using integration by parts

$u = e^{0.025t}$, $dv = \sin t$, $du = 0.025e^{0.025t}$, $v = -\cos t$

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

$\int \sin t\, e^{0.025t} = e^{0.025t}(-\cos t) - \int -\cos t\,(0.025e^{0.025t})$

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

$\int e^{0.025t}\cos t =$

$u = e^{0.025t}$, $dv = \cos t$, $du = 0.025e^{0.025t}$, $v = \sin t$

$\int e^{0.025t}\cos t \cdot \int e^{0.025t}(\sin t) - \int \sin t\,(0.025e^{0.025t})$

$\int \sin t\, e^{0.025t} = e^{0.025t}\sin t + 0.025e^{0.025t}\sin t - 0.000625\int \sin t$

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

Using the integral of $\int e^{0.025t}\sin t$

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

$1.000625I = e^{0.025t}(0.025\sin t - \cos t) + C_1$

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

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