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18/ENG03/026
Civil Engineering

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Engineering Mathematics

1a) $dm/dt = \dot{m}_{in} - \dot{m}_{out}$

$\dot{m}_{in} = 50 \times (1+\sin t)$

$\dot{m}_{out} = 30 \times \left(\frac{m}{1200+20t}\right)$

$dm/dt = 50(1+\sin t) - \frac{3m}{120+2t}$

$\frac{dm}{dt} + \frac{3m}{120+2t} = 50(1+\sin t)$

using I.F

$dy/dx + Py = Q$

$P = \frac{3}{120+2t}$, $Q = 50(1+\sin t)$

$\int P\,dt = 3\ln(120+2t)$

$I.F = e^{\int P\,dt} = e^{3\ln(120+2t)} = (120+2t)^3$

$I.F = (120+2t)^3$

$y \cdot I.F = \int Q \cdot I.F\,dx$

$m(120+2t)^3 = 50\int (120+2t)^3(1+\sin t)$

$m(120+2t)^3 = 2t^4 + 480t^3 + 43200t^2 + 1728000t - \cos t(120+2t)^3 + 6\sin t(120+2t)^2 + C$

$m = \frac{(2t^4 + 480t^3 + 43200t^2 + 1728000t) - \cos t + \frac{6\sin t}{(120+2t)} + \frac{C}{(120+2t)^3}}{(120+2t)^3}$

at $t = 0$

$m = 158$

$158 = 50\left(-1 + \frac{C}{(120)^3}\right)$

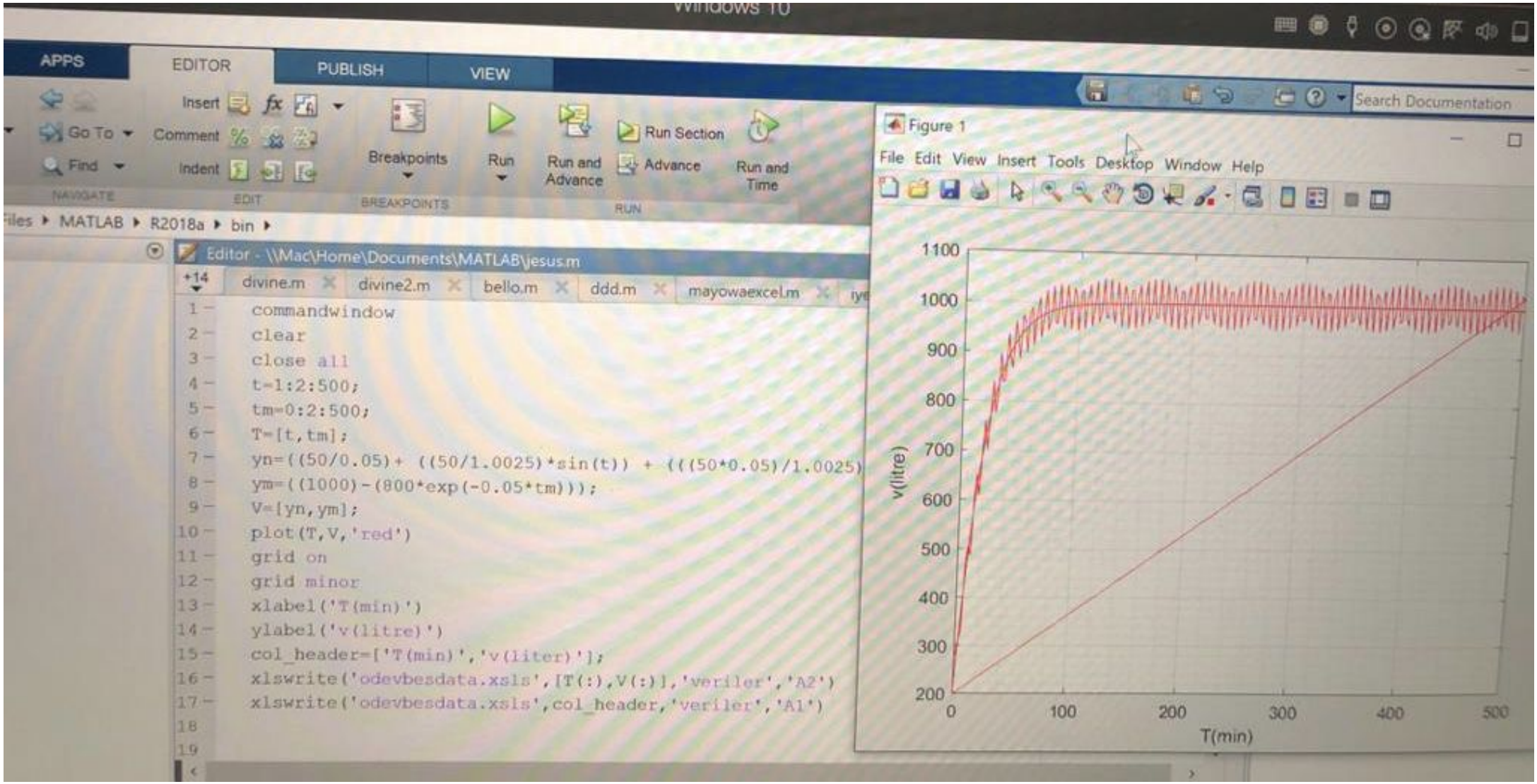
18/ENG03/026

$$150 = -80 + \frac{50C}{120^3}$$

$$C = 518399$$

$$m = \left(2t^4 + \frac{480t^3 + 43206t^2 + 172800t}{(120+2t)^3}\right) - \cos t + \frac{6\sin t}{(120+2t)}$$

$$+ \frac{518399}{(120+2t)^3}$$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divine2.m
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ddd.m
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commandwindow
clear
close all
t=1:2:500;
tm=0:2:500;
T=[t,tm];
yn=((50/0.05)+ ((50/1.0025)*sin(t)) + (((50*0.05)/1.0025)
ym=((1000)-(800*exp(-0.05*tm)));
V=[yn,ym];
plot(T,V,'red')
grid on
grid minor
xlabel('T(min)')
ylabel('v(litre)')
col_header=['T(min)','v(liter)'];
xlswrite('odevbesdata.xsls',[T(:),V(:)],'veriler','A2')
xlswrite('odevbesdata.xsls',col_header,'veriler','A1')
Figure 1
File Edit View Insert Tools Desktop Window Help
v(litre)
T(min)
1100
1000
900
800
700
600
500
400
300
200
0
100
200
300
400
500