

# OBE CORNELIUS MBA

18/ENG06/049

MECHANICAL ENGINEERING

ENG 282 (ENGINEERING MATHEMATICS)

1.) Accumulate Rate = Input rate of salt - Output rate of salt

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

One gallon contains  $(1 + \sin t)$  lb of salt

And since 50 gallons of brine enters the tank every minute

at  $t = 1$

$$(1 + \sin t) = (1 + \sin(1)) = 1.02 \text{ lb of salt}$$

$$y_{in} = 50 \text{ gal/min} \times 1.02 \text{ lb/gal} = 51 \text{ lb/min}$$

$$\frac{30 \text{ gal}}{1200 \text{ gal}} = 0.025$$

0.025 is 2.5% of the content in the tank

2.5% of the salt leave the tank every minute

$$= 2.5\% / \text{min} \Rightarrow 2.5 \text{ of } y_{out}$$

$$a) \frac{dy}{dt} = 51 \text{ lb/min} - 2.5 \text{ of } y \text{ lb/min}$$

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

$$\frac{dy}{dt} = -0.025 \left[ \frac{-0.025y + 51}{-0.025y - 0.025} \right]$$

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

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

$$\ln(y - 2040) = -0.025t + C;$$

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

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

Given that when  $t = 0$  min (initial time)  $y = 150$  lb

$$150 = y_0 e^{-0.025(0)} + 2040;$$

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$$150 - 20t + 2y_0 x_1$$

$$y = -18.90$$

$$y_1 = (21870e^{10 \times 0.025t} + 2040) \text{ PNA}$$

$$y_2 = 2040e^{-18.90e^{-0.025t}}$$

ПРИЗНАЧЕНИЕ ЗАДАЧАТОМ  
 580 PNA

$$y_0 - n_1 y = \frac{y_1}{y_2}$$

для 10 д (t=1)

предост. сат. звание. иуд. 10 звание. 02. 02. 02. 02.

$$150 - 20 \times 1 + 2y_0 \times 1 = ((1) \times 18.90) + (18.90 \times 1)$$

$$150 - 20 + 2y_0 = 18.90 + 18.90 \times 1$$

$$130 + 2y_0 = 37.80$$

крат. сат. звание. иуд. 10 звание. 02. 02. 02. 02.

сат. звание. иуд. сат. звание. иуд. 10 звание. 02. 02. 02. 02.

$$130 + 2y_0 = 37.80$$

$$2y_0 = 37.80 - 130$$

$$12 + 1300.0 - \frac{y_0}{2} \leq 1300.0 - 12$$

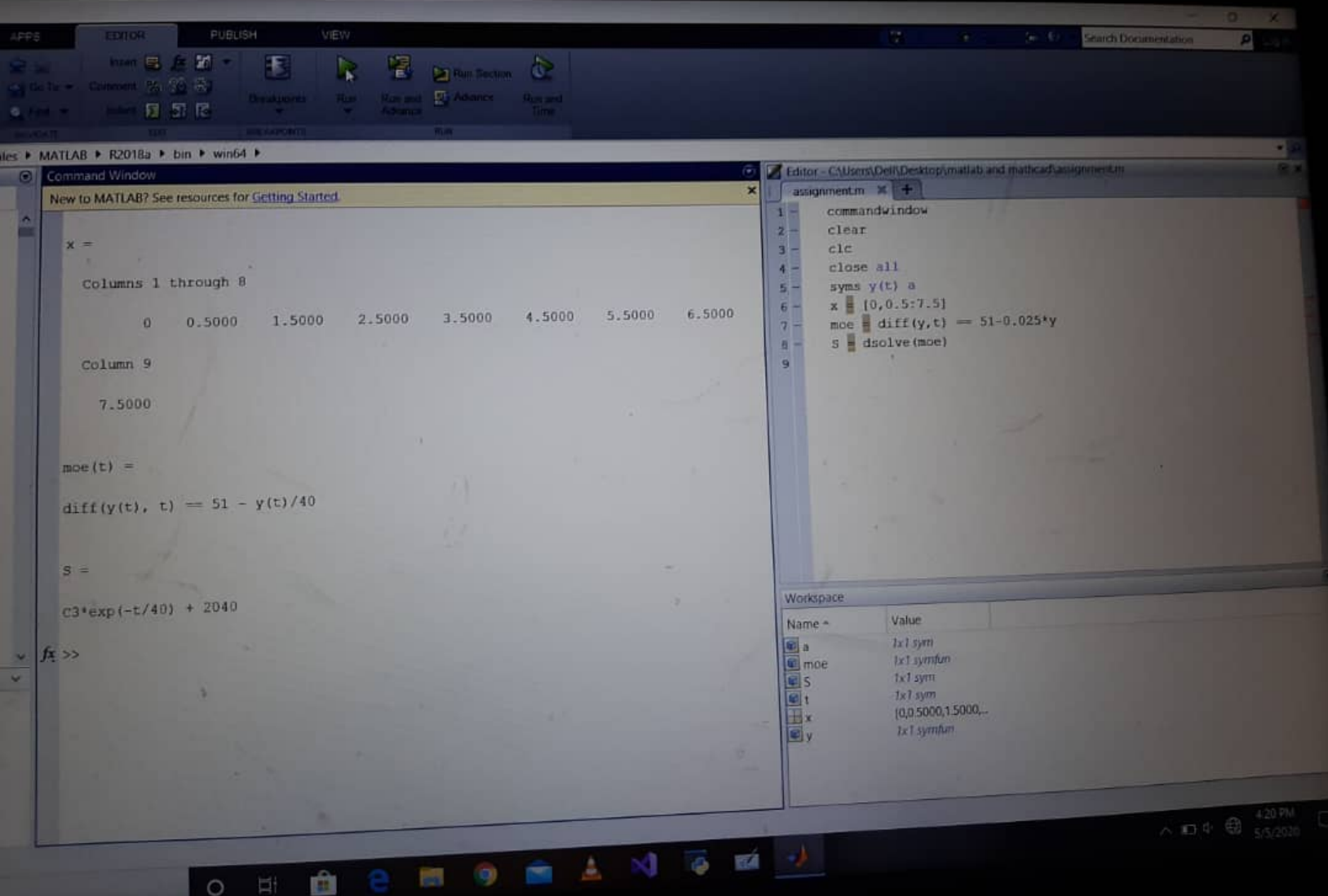
$$\frac{y_0}{2} \leq 1300.0 - 12$$

$$12 + \frac{1300.0 - y_0}{2} \leq 1300.0 - 12$$

$$250.0 - \frac{y_0}{2} \leq \frac{y_0}{2}$$

$$250.0 - \frac{y_0}{2} \leq \frac{y_0}{2}$$





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1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - syms t
6 - y = (50/0.05)+((50/1.0025)*sin(t))+(((50*(0.05))/1.0025)*cos(t))
7 - ym = 1000-(800*exp(-0.05*t))
8 - oddValues = 1:2:500
9 - evenValues = 2:2:500
10 - ym = double(subs(y, oddValues))
11 - ymm = double(subs(ym, evenValues))
12 - totTime = 1:1:500
13 - timeTrans = totTime'
14 - c = reshape([ym, ymm], [], 1)
15 - combVal = double(c)
16 - plot(totTime, c)
17 - grid on
18 - grid minor
19 - xlabel('T(min)'), ylabel('V(litre)')
20 - col_header = {'t(min)', 'V(Litre)'}
21 - xlswrite('odevbesdata.xlsx', col_header, 'veriler', 'A2')
22 - xlswrite('odevbesdata.xlsx', timeT, 'veriler', 'A3')
23 - xlswrite('odevbesdata.xlsx', combined, 'veriler', 'B2')

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Workspace

Name	Value
c	62750x1 double
combVal	62750x1 double

script

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6:52 PM  
5/6/2020

