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18/ENG041018

Electrical/Electronics Engineering.

1. $\int_{e^{40}}^1 (\sin(t) + 1) dt$

Substitute $u = \frac{t}{40} \rightarrow \frac{du}{dt} = \frac{1}{40}$ (steps) $\rightarrow dt = 40 du$

$$= 40 \int e^u (\sin 40u) + 1 du$$

Now Solving

$$\int e^u (\sin 40u) + 1 du$$

Integrate by parts: $\int fg' = fg - \int f'g$

$$1 = \sin 40u, \quad g' = e^u$$

$$f' = 40 \cos 40u, \quad g = e^u$$

$$f' = 40 \cos 40u, \quad g = e^u \\ = e^u (\sin 40u) + 1 - \int 40e^u \cos 40u du$$

Now Solving

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

Apply linearity

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

Now solving.

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

We will integrate by parts twice in a row: $\int fg' = fg - \int f'g$
First time

$$f = \cos 40u, \quad g' = e^u$$

$$f' = -40 \sin 40u, \quad g = e^u$$

$$= e^u \cos 40u - \int -40e^u \sin 40u du$$

$$= e^u \cos(40u) - \int -40e^u \sin(40u) du$$

Second Time

$$f = -40 \sin(40u) \quad g' = e^u$$

$$f' = -1600 \cos(40u), \quad g = e^u$$

$$= e^u \cos(40u) - (-40e^u \sin(40u)) - \int -1600e^u \cos(40u) du$$

Apply linearity

$$= e^u \cos(40u) - (-40e^u \sin(40u)) + 1600 \int e^u \cos(40u) du$$

$$= \underline{40e^u \sin(40u)} + e^u \cos(40u)$$

1601

$$40 \int e^u \cos(40u) du$$

$$= \underline{40(40e^u \sin(40u)) + e^u \cos(40u)}$$

1601

$$e^u \sin(40u) + 1 - \int 40e^u \cos(40u) du$$

$$= e^u (\sin(40u) + 1) - \underline{40(40e^u \sin(40u) + e^u \cos(40u))}$$

1601

$$40 \int e^u (\sin(40u) + 1) du$$

$$= \underline{40e^u (\sin(40u) + 1) - 1600(40e^u \sin(40u) + e^u \cos(40u))}$$

1601

$$40e^{1/40} (\sin(t) + 1) - \underline{1600(40e^{1/40} \sin(t) + e^{1/40} \cos(t))}$$

1601

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

$$= \underline{2000e^{1/40} (\sin(t) + 1) - 80000(40e^{1/40} \sin(t) + e^{1/40} \cos(t))}$$

1601

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

$$= \underline{2000e^{1/40} (\sin(t) + 1) - 80000(40e^{1/40} \sin(t) + e^{1/40} \cos(t))}$$

1601

$$= \underline{2000e^{1/40} (\sin(t) + 1) - 40 \cos(t) + 1601 + c}$$

1601

$$80000 \frac{1}{40} \left(\frac{\sin(t)}{40} - \cos(t) \right) + 2000 e^{1/40} + C$$

1601

$$2000 e^{1/40} (\sin(t) - 40 \cos(t) + 1601) + C.$$

$$y = 2000 (1 - \sin t) - 1850 e^{-0.025}.$$

1c. Using Matlab.

1) Command Window

2) Clear

3) Clc

4) close all

5) Syms int

6) ans = (Dmt 0.025m = 50x50 * sin(t), mCo) = 150

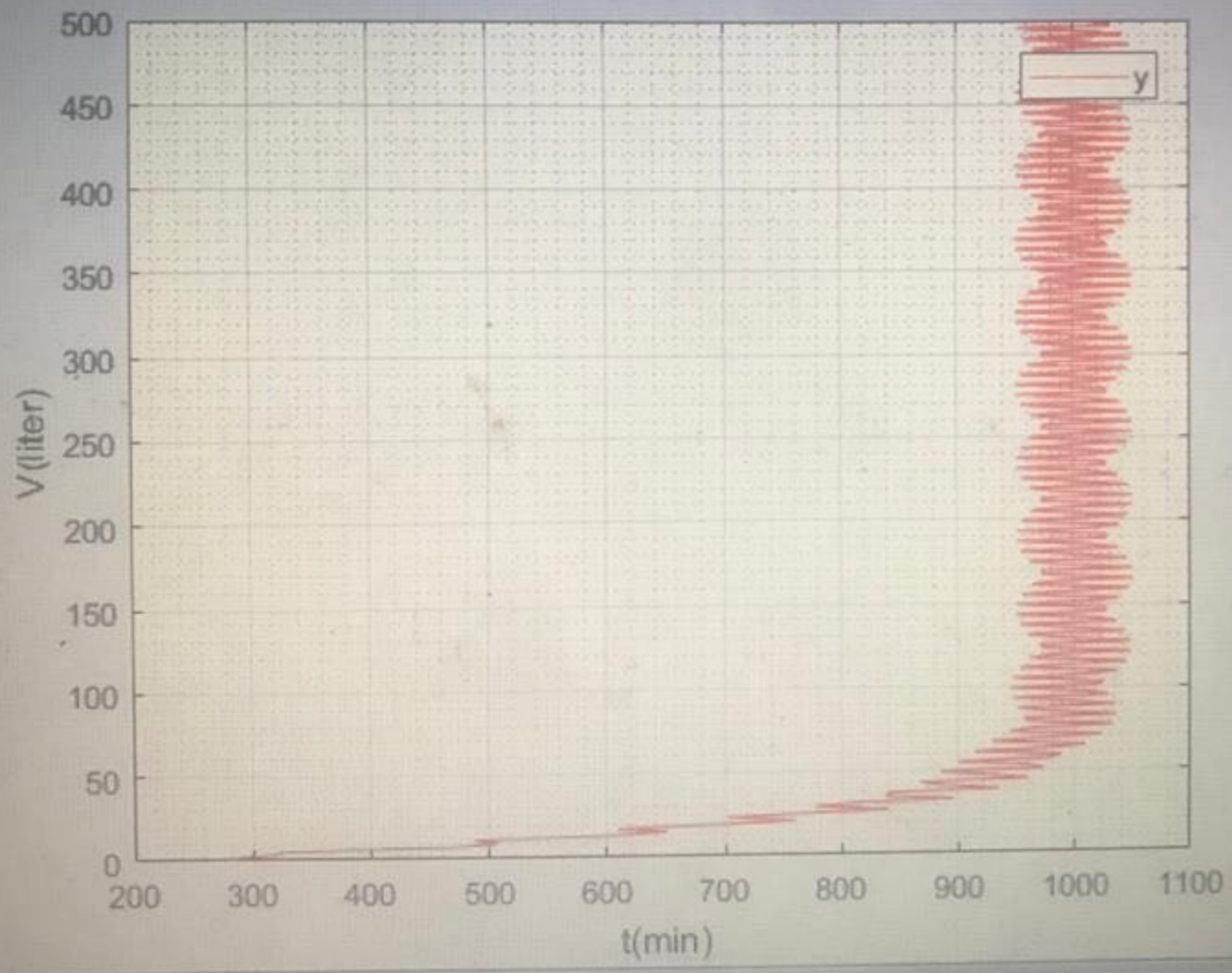
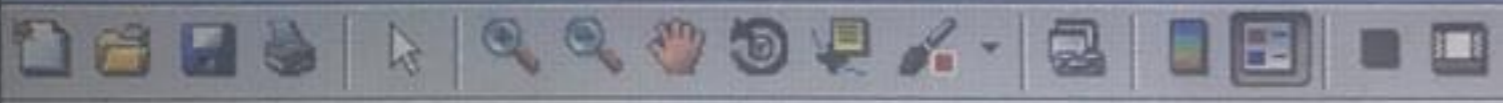
7) t = 0:0:5:450

8) tn = Subs(On, t)

9) Plot=Ct, tn)

Figure 1

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05*τ))

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excel_gui... x  excelll.m x  pastquestions... x  reversion1... x  Vector_2... x  Assignment_... x  onlinequi... x  Assignment_... x  practice_m

1 - commandwindow
2 - clear all
3 - clc
4 - close all
5 - format shortg
6 - t=xlsread('Assignment_V','Number_2a')
7 - y=(50/0.05)+(50*sin(t)/1.0025)+(50*0.05*cos(t)/1.0025)-(802.49*exp(-0.05*t))
8 - ym=1000-(800*exp(-0.05*t))
9 - ys=y(1:2:500,1)
10 - ts=t(1:2:500,1)
11 - yms=ym(2:2:500,1)
12 - tms=t(2:2:500,1)
13 - plot(ys,ts,'green')
14 - hold on
15 - plot(yms,tms,'blue')
16 - grid on
17 - grid minor
18 - legend('y','y_m')
19 - xlabel('t(min)')
20 - ylabel('V(Litre)')
```