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Q1

$$T_i = 10^\circ\text{C}$$

$$T_f = 20^\circ\text{C} \text{ @ } 5\text{min}$$

$$T_{\text{actual}} = 25^\circ\text{C}$$

$$\frac{dT}{dt} \propto (T - T_A)$$

$$\frac{dT}{dt} = k(T - T_A)$$

$$dT/dt = k(T - 25)$$

$$\frac{dT}{(T - 25)} = k dt$$

$$\ln(T - 25) = kt + C$$

$$T - 25 = e^{kt+C}$$

$$T - 25 = e^{kt} \cdot e^C$$

$$\text{let } e^C = A$$

$$T - 25 = A e^{kt}$$

$$T = A e^{kt} + 25$$

$$\text{at initial } t = 0, T = 10$$

$$10 = A e^0 + 25$$

$$A = -15$$

$$T = -15 e^{kt} + 25$$

$$\text{at } T = 20^\circ\text{C}, t = 5\text{min}$$

$$20 = -15 e^{5k} + 25$$

$$-5 = -15 e^{5k}$$

$$e^{5k} = e^{0.333}$$

$$\ln(0.667/0.333)$$

$$k = \frac{\ln(0.667/0.333)}{5}, k = 0.05$$

$$T = 35 e^{0.05t} - 25$$

$$19.9 = 35 e^{0.05t}$$

$$e^{0.05t} = 19.9/35$$

$$e^{0.05t} = \ln(1.426)$$

$$0.05t = 0.355$$

$$t = 7.1\text{min}$$

MATLAB R2018a

HOME PLOTS APPS EDITOR PUBLISH VIEW

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New Open Save Compare Go To Comment % Breakpoints Run Run and Advance

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FILE NAVIGATE EDIT BREAKPOINTS RUN

C:\Program Files\MATLAB\R2018a\bin

Editor - C:\Users\Seyitan\Documents\MATLAB\eng282quiz2.m

```
1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - syms t V
6 - mdata=xlread('onlinequizdata','fluiddata');
7 - t=mdata(1:2:250,1)
8 - V=mdata(1:2:250,2)
9 - plot(t,V)
10 - grid on
11 - grid minor
12 - xlabel('Time (min)')
13 - ylabel('Volume (m3)')
```

Current Folder

Workspace

Command Window

```
###:###
999.9934
999.9940
999.9946
999.9951
999.9956
999.9960
999.9964
999.9967
```

Figure 1

File Edit View Insert Tools Desktop Window Help

Time (min)	Volume (m3)
0	200
25	600
50	850
75	950
100	990
125	995
150	998
175	999
200	999.5
225	999.8
250	999.9

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