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DEPARTMENT: BIOMEDICAL ENGINEERING

$$T_1 = 10^\circ\text{C}$$

$$T_2 = 20^\circ\text{C} \text{ when } t = 5 \text{ mins}$$

$$T_0 = 25^\circ\text{C}$$

$$T = ?$$

Using  $\frac{dT}{dt} \propto (T - T_0)$

$$\frac{dT}{dt} = k(T - T_0)$$

$$\frac{dT}{(T - T_0)} = k dt$$

$$\int \frac{dT}{(T - T_0)} = \int k dt$$

$$\ln(T - T_0) = t k + C$$

Recall  $T_0 = 25^\circ\text{C}$

$$\therefore T - 25 = e^{tk+C}$$

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

If  $e^C = A$

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

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

when  $T = 20^\circ\text{C}$  at  $t = 5 \text{ mins}$

Using  $T = A e^{tk} + 25$

$$20 = 35 e^{5k} - 25$$

$$45 = 35 e^{5k}$$

$$e^{5k} = \frac{45}{35}$$

~~Taking~~  $\ln$  of

$$5k = \ln\left(\frac{45}{35}\right)$$

$$k = \frac{0.251}{5}$$

$$\therefore k = 0.05$$

$$\text{Recall, } T = 35e^{kt} - 25$$

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

$$\text{when } T = 24.9$$

$$24.9 = 35e^{0.05t} - 25$$

$$49.9 = 35e^{0.05t}$$

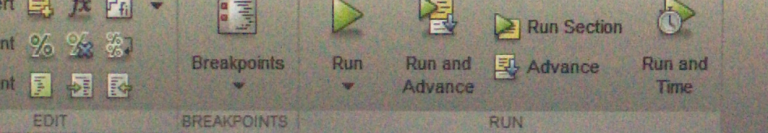
$$e^{0.05t} = \frac{49.9}{35}$$

$$e^{0.05t} = \ln\left(\frac{49.9}{35}\right)$$

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

$$0.05t = 0.355$$

$$t = \frac{0.355}{0.05} = 7.1 \text{ mins}$$



MATLAB

```
Editor - C:\Users\amanda\Documents\MATLAB\oghos20.m  
+1 AMANDIV.m x mandy2020.m x amandacitaa.m x matrices.m  
1 - commandwindow  
2 - clear  
3 - clc  
4 - close all  
5 - format short g  
6 - mdata=xlsread('onlinequizdata','fluiddata')  
7 - a=mdata(1:2:250,1)  
8 - b=mdata(1:2:250,2)  
9 - figure (1)  
10 - plot(a,b)  
11 - grid on  
12 - grid minor  
13
```

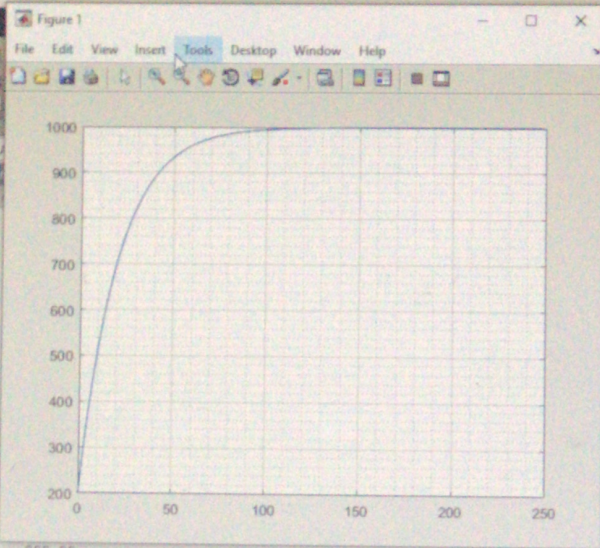
Command Window

New to MATLAB? See resources for [Getting Started](#).

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