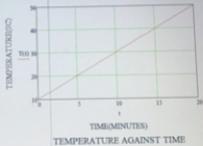


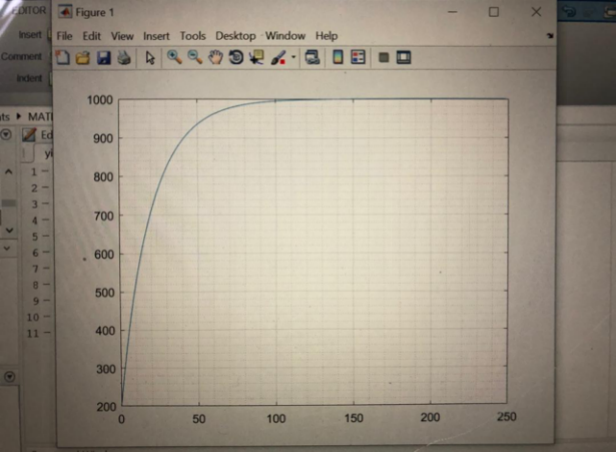
$$t := 0..20$$

$$T(t) := 2t + 10$$

$$T(t) =$$

10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
...





```
commandwindow
clear
clc
close all
format short g
mdata=xlsread('onlinequizdata','fluiddata')
x=mdata(1:2:250,1)
y=mdata(1:2:250,2)
plot(x,y)
grid on
grid minor
```

I

Command Window

```
86
88
90
92
94
96
98
100
102
```

script

Ln 11 Col 11

DATE: 18/06/2010

NAME: EJim Chisom Peckins  
Edgware, Maths Assignment

$$T(0) = 10^{\circ}\text{C}$$

$$T_a = \frac{0^{\circ}\text{C} + 20^{\circ}\text{C}}{2} = 10^{\circ}\text{C}$$

Applying Newton's Law of cooling

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

$$\frac{dT}{T - 10} = k(T - 10)$$

$$k dt = \frac{dT}{T - 10}$$

$$\ln(T - 10) = kT + c$$

$$e^{\ln(T - 10)} = e^{kT + c}$$

$$T - 10 = e^{kT + c}$$

$$T - 10 = e^{kT} \cdot e^c$$

$$T - 10 = e^{kT} \cdot T_0$$

$$T - T_0 = e^{kT} \cdot T_0$$

$$T(0) = 10^{\circ}\text{C}$$

$$10 - T_0 = e^{k \cdot 0} \cdot T_0$$

$$10 = T_0 + T_0$$

$$T_0 = 10^{\circ}\text{C}$$

Find

$$T = -12.5e^{-kt} + 22.5$$

when  $t = 5$  minutes,

$$T = 20^{\circ}\text{C}$$

Time (min)      Temp

$$0 \qquad 10^{\circ}\text{C}$$

$$5 \qquad 20^{\circ}\text{C}$$

Time to reach  $24.9^{\circ}\text{C}$

$$24.9 - 22.5 = e^{-kt} \cdot T_0$$

To get  $k$ ,

$$20 = -12.5e^{-kt} + 22.5$$

$$25 = 12.5e^{-kt}$$

$$e^{-kt} = \frac{25}{12.5}$$

$$e^{-kt} = 2$$

$$\ln e^{-kt} = \ln 2$$

$$-kt = \ln 2$$

$$k = \frac{\ln 2}{5}$$

$$k = -0.138$$

To get Time to reach  $24.9^{\circ}\text{C}$

$$24.9 - 22.5 = e^{-kt} \cdot T_0$$

$$2.4 = -12.5e^{-0.138t}$$

$$-\frac{2.4}{12.5} = e^{-0.138t}$$

$$\ln 0.192 = -0.138t$$

$$t = 5.16 \text{ minutes}$$