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18/SCI01/016.

1) Initial time $T(0) = 10°C$

After 5 mins $= 20°C$

$T_0 = 25°C$.

Applying Newtons law of cooling

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

$$\frac{dT}{T-25} = Kdt$$

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

$$e^{\ln(T-25)} = e^{(Kt+C)}$$

$$T - 25 = e^{Kt} e^{C}$$

$$T - 25 = e^{Kt} T_0$$

$$T = T_0 e^{Kt} + 25$$

$t = 0$ min, $T = 10°C$ $(T(0) = 10°C)$

$$10 = T_0 e^{K(0)} + 25$$

$$10 - 25 = T_0 (1)$$

$$-15 = T_0$$

$$T_0 = -15$$

Therefore

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

$t = 5$ min $= 20°C$

$$20 = -15e^{Kt} + 25$$

$$20 - 25 = -15e^{Kt}$$

$$\frac{-5}{-15} = \frac{-15e^{Kt}}{-15}$$

$$e^{Kt} = 0.33$$

$$e^{(5)K} = 0.33$$

$$5K = \ln(0.33)$$

...449 gotten in my math cad

$t = 33$ min when ~~t = 33~~

$5k = -1.099$

$k = \frac{-1.099}{5}$

$k = -0.2198$

Therefore

$T = -15e^{-0.2198t} + 25$

To get for when $T = 24.9°C$

from the table gotten in my math cad

$T = 24.9°C$ when

$t = 23$ min

Mathcad Professional - [UEOMA ALANZA]

File Edit View Insert Format Math Symbolics Window Help

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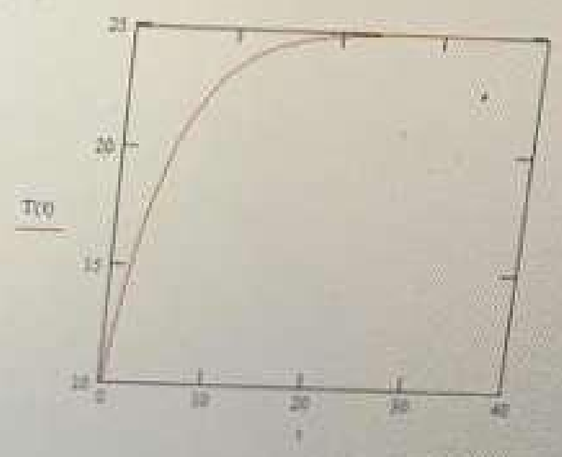
$t := 0..35$

$T(t) := -15e^{-0.2198(t)} + 25$

t	T(t)
20	24.815
21	24.852
22	24.881
23	24.904
24	24.922
25	24.936
26	24.947
27	24.96
28	24.968
29	24.974
30	24.979
31	24.984
32	24.987
33	24.989
34	24.991
35	24.993



Calculator

Matrix

Press F1 for help.

AUTO

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```
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
```

Command Window

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

script Ln 11 Col 11

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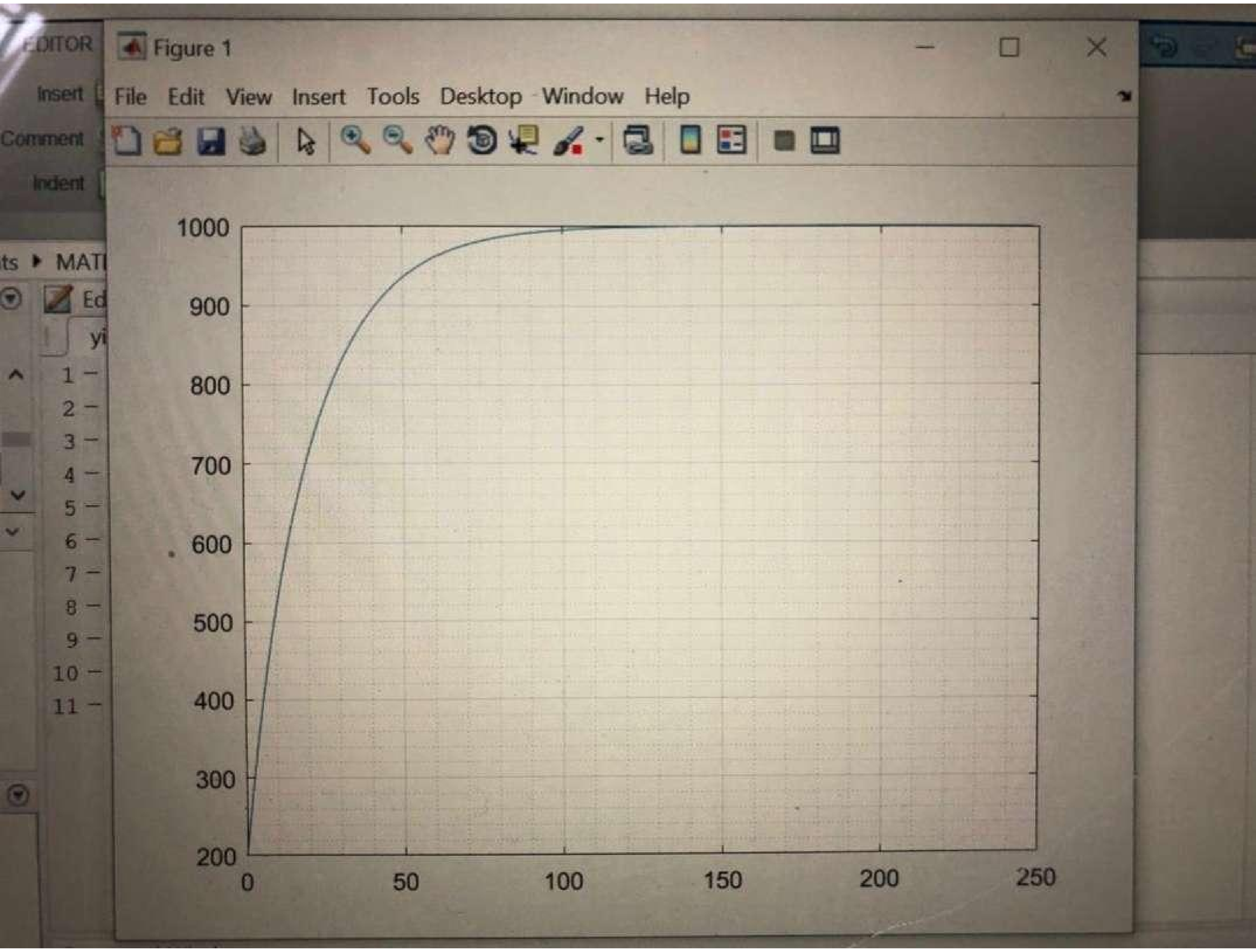

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