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 14/EN908/012  
 Biomechanical Engg.  
 EN9282 Q4.3

Textual = 25°C  
 T<sub>a</sub> = actual Temp.

1)  $T = 10^\circ\text{C}$        $T = 20^\circ\text{C}$       @  $t = 5\text{min}$

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

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

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

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

$$\ln(T - 25) = t k + c$$

$$\therefore T - 25 = e^{tk+c} \quad \text{where } e^c = A$$

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

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

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

@ initial condition  $t = 0$        $T = 10^\circ\text{C}$

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

$$A = 35$$

$$T = 35 e^{tk} - 25$$

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

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

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

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

$$5k = \ln(45/35)$$

$$k = \frac{0.251}{5} \Rightarrow k = 0.05$$

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

$\Rightarrow T = 24.9$  at  $t = ?$

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

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

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

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

$$0.05t = 0.355$$

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

```
yimaquiz2.m x +  
- 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  
fx 102

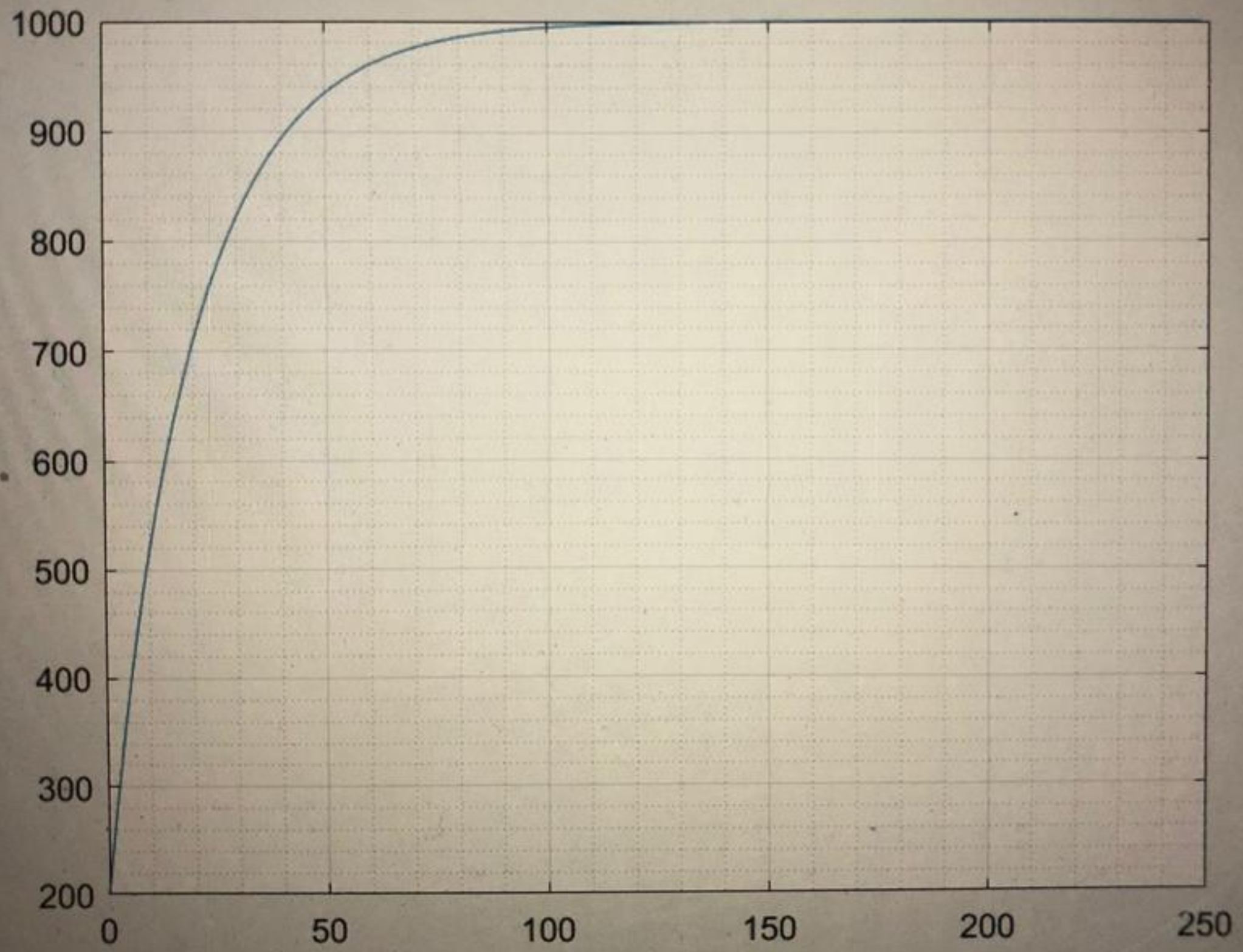
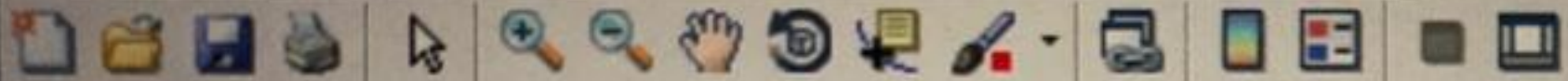


EDITOR

Figure 1



File Edit View Insert Tools Desktop Window Help



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