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187ENG 04/029

DATE

$$T_1 = 100^\circ\text{C}$$

$$T_2 = 20^\circ\text{C} \quad \text{at } t = 5 \text{ ms} = 300 \text{ seconds}$$

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

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

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

$$dT = k dt$$

$$(T - 25)$$

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

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

$$T - 25 = A e^{t k}$$

$$T = A e^{t k} - 25$$

at initial condition $t = 0, T = 100^\circ\text{C}$

$$100 = A e^0 - 25$$

$$A = 35$$

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

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

$$20^\circ\text{C} = 35 e^{5k} - 25$$

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

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

$$e^{5k} = 1.2857$$

$$5k = \ln 1.2857$$

$$5k = 0.2513$$

DATE

$$k = 0.05026$$

$$T = 35 e^{0.05026t} - 25$$

$$T = 24.9 \text{ at } t = ?$$

$$24.9 = 35 e^{0.05026t} - 25$$

$$49.9 = 35 e^{0.05026t}$$

$$e^{0.05026t} = \frac{49.9}{35}$$

$$e^{0.05026t} = 1.4257$$

$$0.05026t = \ln 1.4257$$

$$0.05026t = 0.3547$$

$$t = \frac{0.3547}{0.05026}$$

$$t = 7.057 \text{ minutes}$$

```
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
```

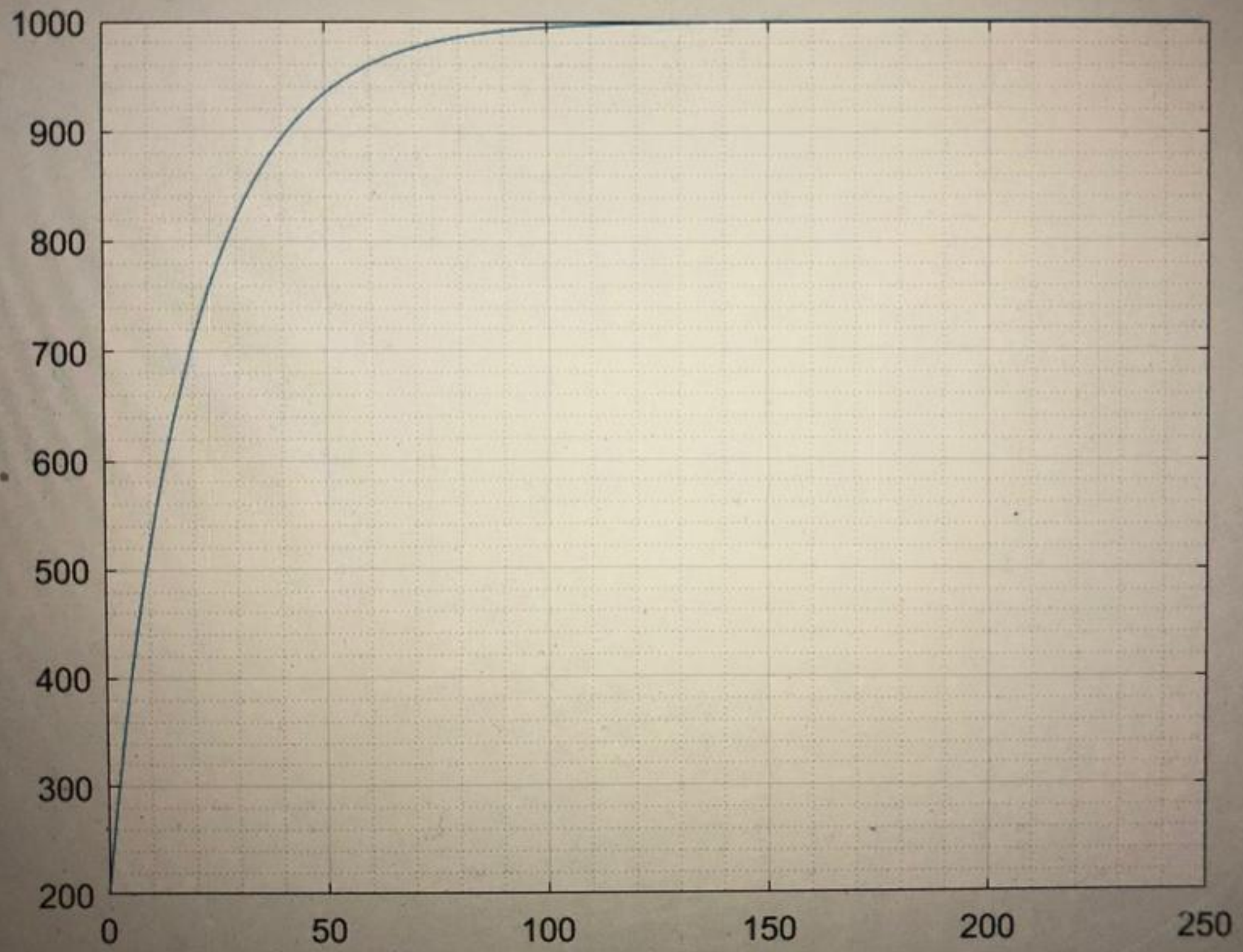
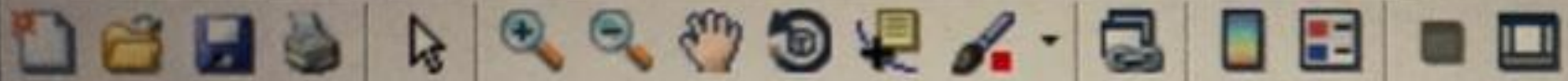
Command Window
86
88
90
92
94
96
98
100
fx 102

EDITOR

Figure 1



File Edit View Insert Tools Desktop Window Help



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