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$$T_{\text{initial}} = 10^{\circ}\text{C}$$

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

at 5 mins

$$T_{\text{actual}} = 25^{\circ}\text{C}$$

$$dT/dt \propto (T - T_A)$$

$\therefore T_A = \text{Actual temperature}$

$$dT/dt = k(T - T_A)$$

$$dT/dt = k(T - 25)$$

collecting like terms

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

By integrating both sides

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

$$T-25 = e^{tk+C} \text{ where } e^C = A$$

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

$$T-25 = Ae^{tk}$$

$$T = Ae^{tk} - 25$$

at initial conditions $t=0$, $T=10^{\circ}\text{C}$

$$10 = Ae^0 - 25$$

$$A = 35$$

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

$$t = 5 \text{ minutes}$$

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

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

$$\frac{45}{e^{5k}} = 35e^{5k} - 25$$

$$= 45/35$$

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

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

$$k = 0.05$$

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

$$T = 24.9$$

$$t = ?$$

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

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

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

$$e^{0.05t} = \ln(1.43)$$

$$0.05t = 0.36$$

$$t = 7.2 \text{ min}$$

```
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|
```

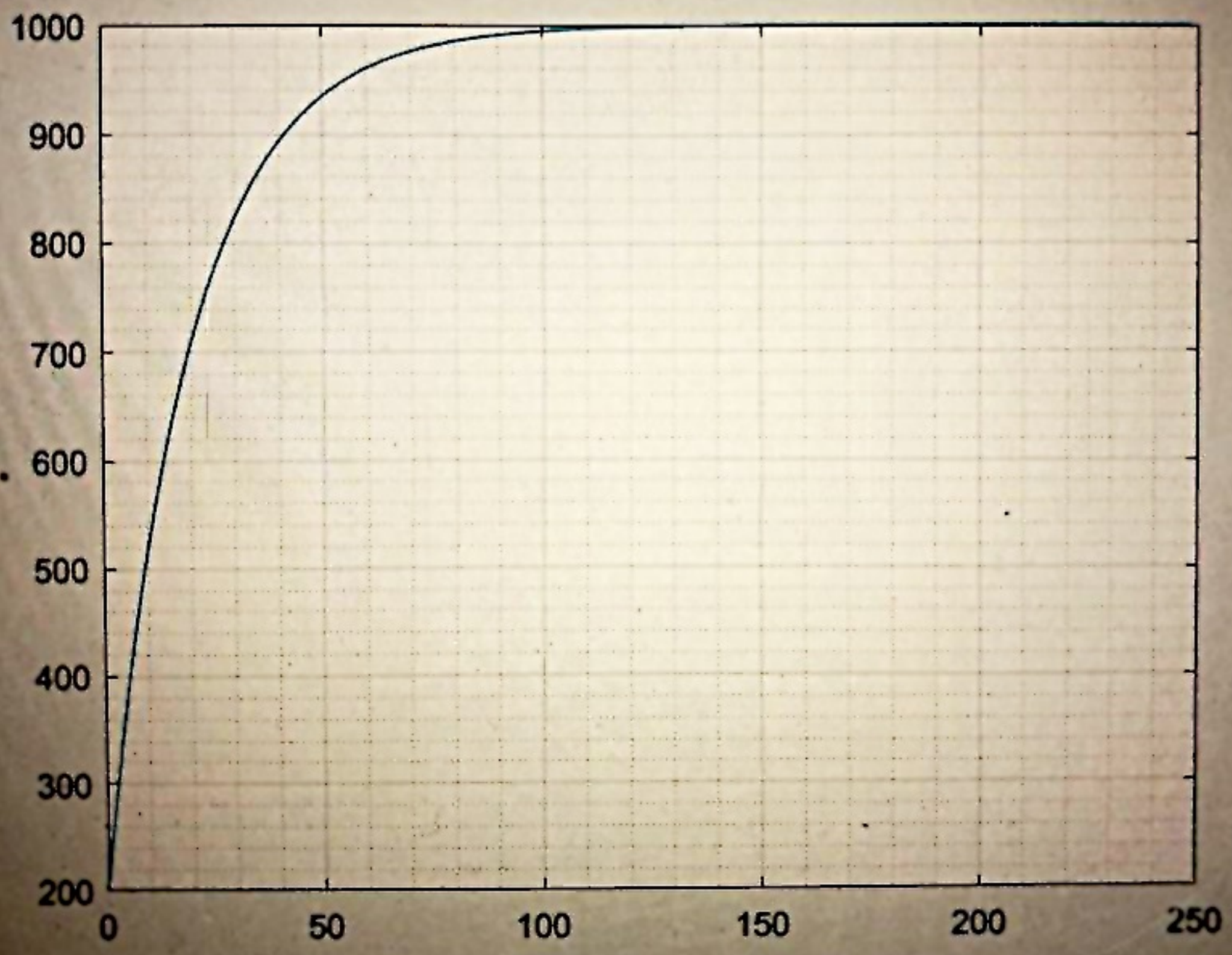
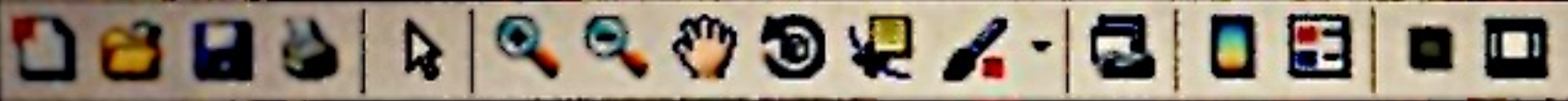
I

Command Window

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

script

Ln 11 Col 11



ts ▶ MAT
Ed
y
1 -
2 -
3 -
4 -
5 -
6 -
7 -
8 -
9 -
10 -
11 -