



```
1 - commandwin
2 - clear
3 - clc
4 - close all
5 - mdatabx1sz
6 - t_mdats(2
7 - plot (t)
```

Command Window

225
227
229
231
233
235
237
239
241
243
245
247
249



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Mechatronics

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

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

$$\int_{20}^{10} \frac{dT}{T - 25} = \int_0^t k dt$$

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

$$\ln(20 - 25) = k(0) + C$$

$$\ln(-5) = C$$

$$\ln(10 - 25) = e^{kt + C}$$

when $t = 0$

$$10 - 25 = e^{kt} \cdot e^C$$

$$-15 = A e^{kt}$$

$$T = A e^{kt} + 25$$

when $t = 0$

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

$$T_0 = -22.5 + 10$$

$$T_0 = -12.5$$

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

after 5 min
 $T = 20^\circ C$

$$20 = -12.5 e^{k(5)} + 25$$

$$12.5 e^{5k} = 25 - 20$$

$$e^{5k} = \frac{2.5}{12.5}$$

$$e^{5k} = 0.2$$

$$5k = \ln(0.2)$$

$$k = \frac{\ln(0.2)}{5}$$

$$k = -0.322$$

$$T = -12.5 e^{(-0.322)t} + 25$$

$$T = 22.49$$