

Kolman Und David

18/ENG 04042

slab (slab)

$$T_1 = 10^\circ\text{C}$$

$$T_2 = 20^\circ\text{C @ 5 min}$$

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

$$\frac{dT}{dt} \propto T - T_m$$

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

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

slab (slab)

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

integrating both sides

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

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

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

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

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

$$A = 35$$

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

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

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

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

$$5k = \ln\left(\frac{45}{35}\right)$$

$$k = 0.01$$

$$T = 35 e^{0.01t} - 25$$

$$T = 24.9 \text{ at } t=1$$

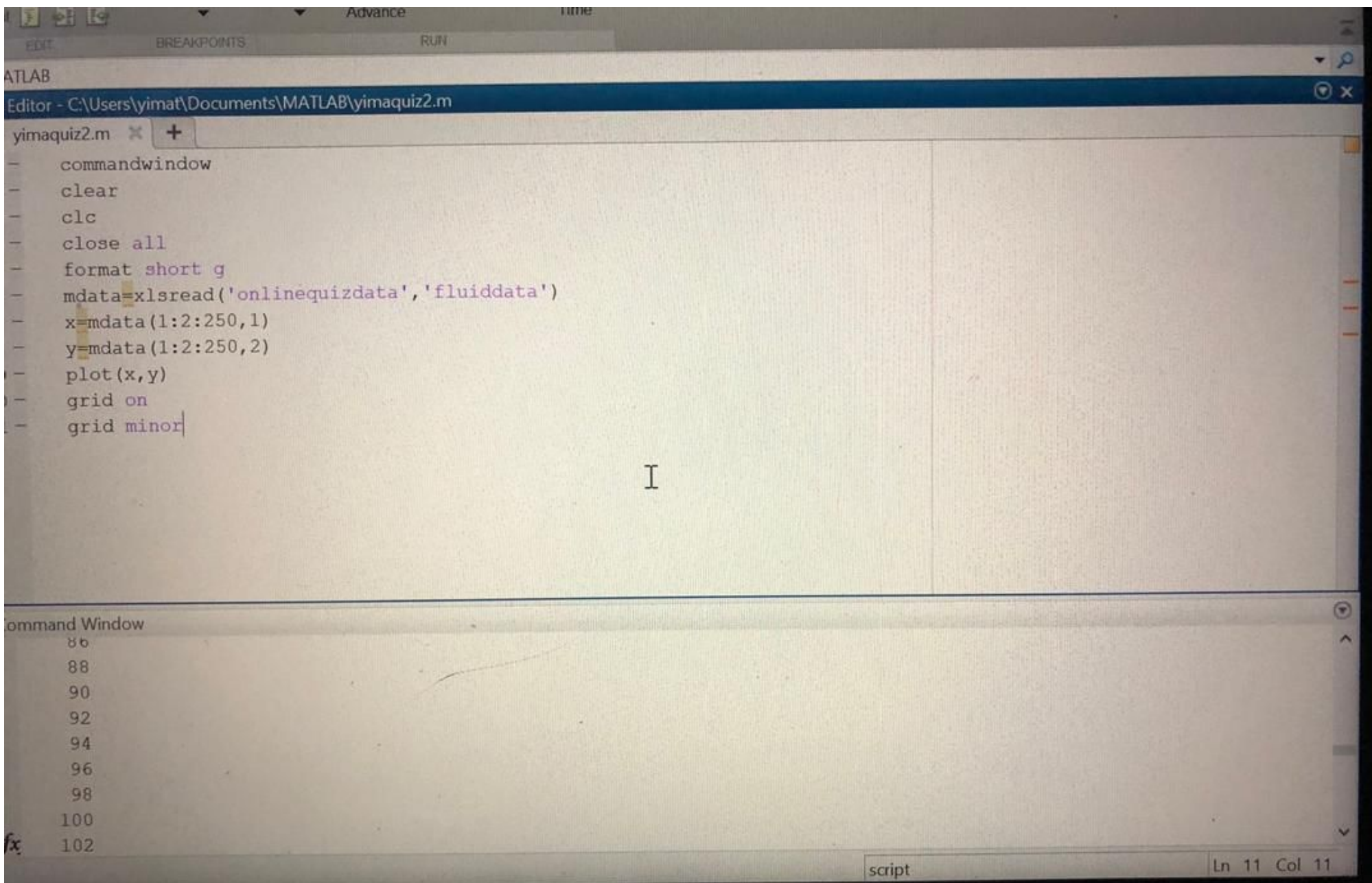
$$24.9 = 35 e^{0.01t} - 25$$

$$49.9 = 35 e^{0.01t}$$

$$e^{0.056} = \ln(1.426)$$

$$0.056 = 0.355$$

$$e^{0.355}$$



fx

script

Ln 11 Col 11

