

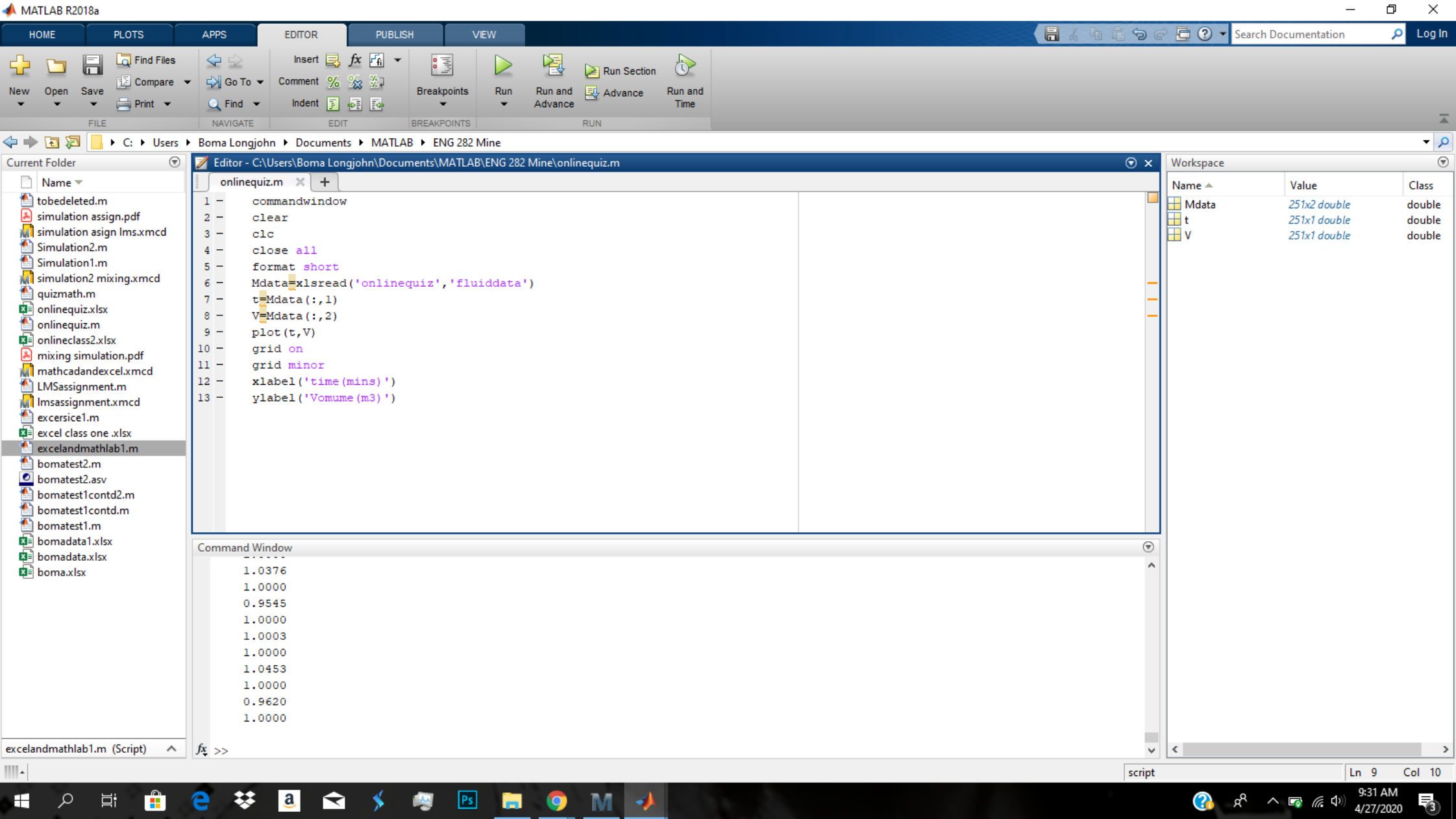
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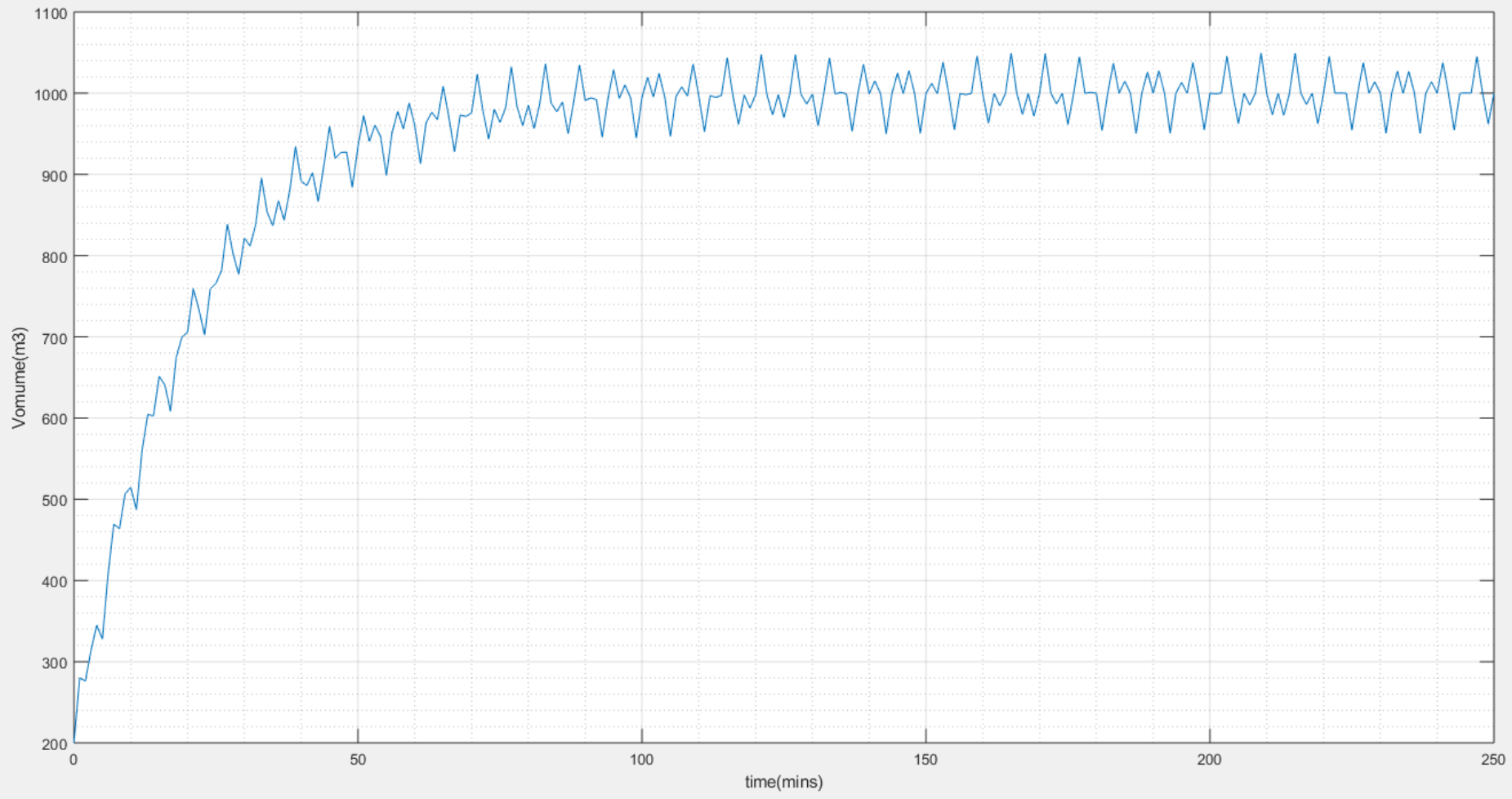
MATRIC NO: 19/ ENG01/020

DEPARTMENT: CHEMICAL

COURSE CODE: ENG 282

Quiz





d

Answer To Online Quiz

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

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

$$T(0s) = 10^\circ C$$

$$T_a = 25^\circ C$$

$$T(5 \text{ mins}) = 20^\circ C$$

$$\frac{dT}{dt} = K(T - 25^\circ C)$$

Integrating both sides

$$\int \frac{dT}{T-25} = \int K dt$$

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

$$e^{\ln(T-25)} = e^{Kt+C}$$

$$(T-25) = e^{Kt} \cdot e^C$$

$$T-25 = e^{Kt} T_0$$

$$T = T_0 e^{Kt} + 25$$

$$T(0s) = 10$$

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

$$10 = T_0(1) + 25$$

$$10 = T_0 + 25$$

$$T_0 = 10 - 25 = -15$$

$$T = -15e^{Kt} + 25$$

$$20 = -15e^{K(5)} + 25$$

$$20 - 25 = -15e^{5K}$$
$$-5 = -15e^{5K}$$

$$\frac{-5}{-15}$$

$$= e^{5K}$$

$$e^{5K} = \frac{1}{3}$$

$$5K = \ln\left(\frac{1}{3}\right)$$

$$K = \ln\left(\frac{1}{3}\right) \div 5$$

$$K = -0.2197$$

$$T = -15e^{-0.2197t} + 25$$

$$24.9^\circ C = -15e^{-0.2197t} + 25$$

$$24.9^\circ C - 25 = -15e^{-0.2197t}$$

$$-0.1 = -15e^{-0.2197t}$$

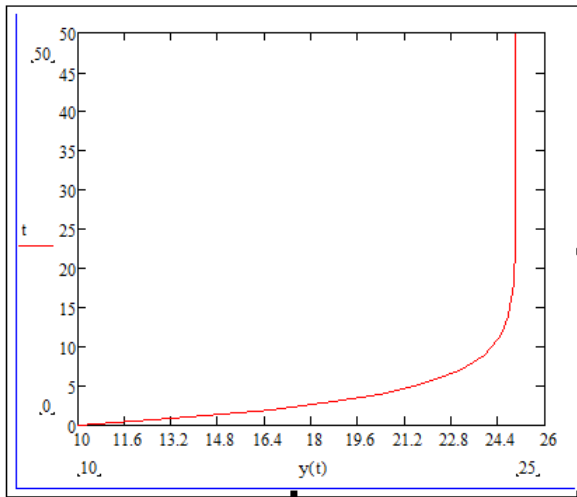
$$6.67 \times 10^{-3} = e^{-0.2197t}$$

$$-5.010e = -0.2197t$$

$$t = 23.09 \text{ sec}$$

t := 0..50

$$y(t) := 25 - 15e^{-0.2917t}$$



Matrix

| | | | |
|---|-----------------------|---------------|-------------------------------|
| $\begin{bmatrix} \dots \\ \dots \\ \dots \end{bmatrix}$ | \times_n | \times^{-1} | $ \times $ |
| $f(t)$ | $M^{\langle \rangle}$ | M^T | $m..n$ |
| $\delta..i$ | $\delta \times i$ | Σ | $\frac{\partial}{\partial x}$ |

Calculator

| | | | | |
|---------------|---------------|-----|----------------|-------------------|
| sin | cos | tan | ln | log |
| n! | i | x | $\sqrt{\quad}$ | $\sqrt[n]{\quad}$ |
| e^x | $\frac{1}{x}$ | () | \times^2 | \times^y |
| π | 7 | 8 | 9 | / |
| $\frac{1}{t}$ | 4 | 5 | 6 | \times |
| \div | 1 | 2 | 3 | + |
| $:=$ | . | 0 | - | = |