Class Exercise 1

Solve the system of ODE below using the ODE Matlab solver and the symbolic Math toolbox,

$$\begin{aligned}\frac{dx}{dt} &= x + 2y - z \\ \frac{dy}{dt} &= x + z \\ \frac{dz}{dt} &= 4x - 4y + 5z\end{aligned}$$

using the initial conditions x(0)=1, y(0)=2, and z(0)=3, for the t=[0 0.5].

Class Exercise 2

Solve the predator-prey system of ODE below using the ODE Matlab solver and the symbolic Math toolbox,

$$\begin{aligned}\frac{dN_p}{dt} &= 0.1N_p - 0.005N_pN_h \\ \frac{dN_h}{dt} &= -0.02N_h + 0.001N_pN_h\end{aligned}$$

using the initial conditions for prey and predator given as $N_p(0)$=40, $N_h(0)$=9, for the t=[0 100] and t=[0 1000].

Class Exercise 3

Solve the DAE system below,

$$\begin{aligned}\frac{dA}{dt} &= -kA \\ c &= qA + rB\end{aligned}$$

for t=[0 20] with k=0.1386, q=1, r=2, c=3.