1. Using Runge-Kutta technique and $h = 0.01$, find a solution to the following set of differential equations

$$\begin{aligned}\dot{x} &= 10(y - x)\\ \dot{y} &= 28x - y - xz\\ \dot{z} &= xy - \frac{8}{3}z\end{aligned}$$

for t (the independent variable) from 0 to 20, where $x(0) = 1$, $y(0) = 2$ and $z(0) = 3$. Display the corresponding path in a 3-dimensional picture.

2. Similarly, solve

$$\ddot{y} + y - \dot{y}(1 - y^2) = 0$$

for t from 0 to 10, where $y(0) = 1$ and $\dot{y}(0) = 2$. Display y as a function of t. How close can you get to the two initial values by reversing the direction of time and 'backtracking' to $t = 0$.

Optional: Repeat the same, with t going from 0 to 20.