Problem

The Lotka-Volterra system of differential equations is commonly used to model the evolution of two populations of predators NP and prey Np. The following hypotheses hold:

1. Prey population increases proportionally to the number of prey (with constant α) but is destroyed by predators at a rate proportional to the product of the numbers of prey and predators (with constant β).

2. Predator population decreases at a rate proportional to the number of predators, but increases at a rate again proportional to the product of the numbers of prey and predators. The constants associated to each event are γ and δ, respectively.

Solve the systems of ODES up to t=15

- Find by trial and error an adequate time step.
- Plot the time evolution of both populations.
- Plot the populations of predators *vs.* the population of prey.
- Find the maximum and minimum of each population and of the sum of both.

Data: initial prey population = 7000; initial predator population = 2000; $\alpha = 1.2$; β =0.00006; $\gamma = 0.8$; $\delta = 0.00005$;

HELP:

A matlab code for integration of systems of ODE using Forward-Euler is provided