ENEE 765 2017 Homework # 1

due : 2017-09-14

1. Consider the closed loop system

$$\dot{y} = (a - bk)\, y$$

$$\dot{k} = \beta y^2$$

under assumptions of Lecture Notes 1.

(i) Solve explicitly this system to obtain $y(t)$ and $k(t)$ in analytical form. Write a MATLAB script to plot the results in (y, k) plane and display the same for a range of initial conditions. (make a reasonable choice of a and b)

(ii) Write a separate MATLAB script using a standard numerical integration routine, and check it against your results in (i), for same choice of a and b (and hence β) and same initial conditions.

(iii) Now allow b to be time varying by multiplying the choice of b you made earlier by $\sin(\omega t)$ for $\omega = 0.1$, $\omega = 0.5$

and $\omega = 0.1$. Use the numerical method you used in (ii) to integrate closed loop system. Discuss the observed results in these three cases of ω.

2 READING

Read and understand closely chapters 0 and 1 of the Sastry-Bodson book upto page 24.