

Computational and Numerical Methods

Group 16

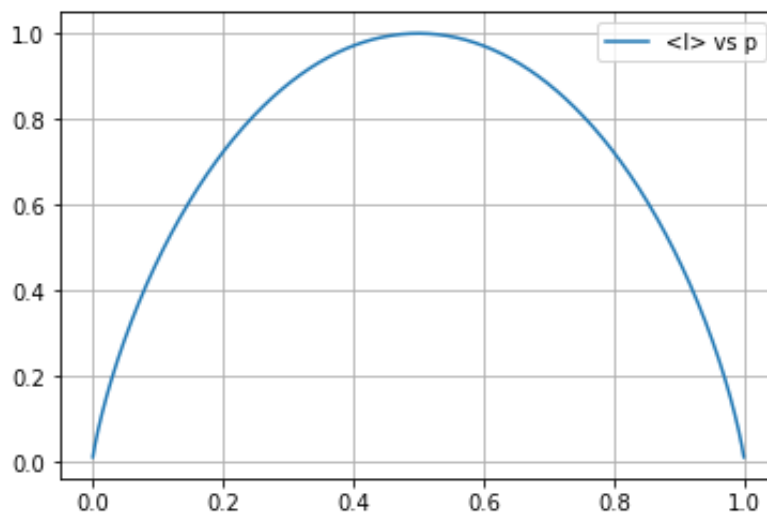
Assignment 1

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Show Code

Q1.a



We can see that the graph peaks when the value of P is 0.5

Q1.b

$$I = -k(p \log_2 p + (1 - p)(\log_2(1 - p)))$$

$$p = 0.5 + \epsilon$$

$$\therefore I = -k((0.5 + \epsilon) \log_2(0.5 + \epsilon) + (0.5 - \epsilon)(\log_2(0.5 - \epsilon)))$$

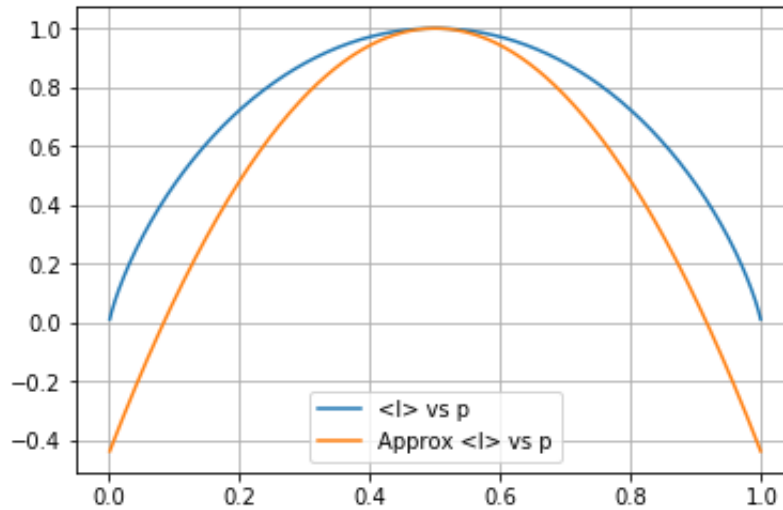
$$\therefore I = -k((0.5 + \epsilon) \left(\frac{\ln(1+2\epsilon)}{\ln 2} \right) + (0.5 - \epsilon) \left(\frac{\ln(1-2\epsilon)}{\ln 2} \right))$$

$$\therefore I = -k((0.5 + \epsilon) \left(\frac{2\epsilon}{\ln 2} \right) + (0.5 - \epsilon) \left(\frac{-2\epsilon}{\ln 2} \right))$$

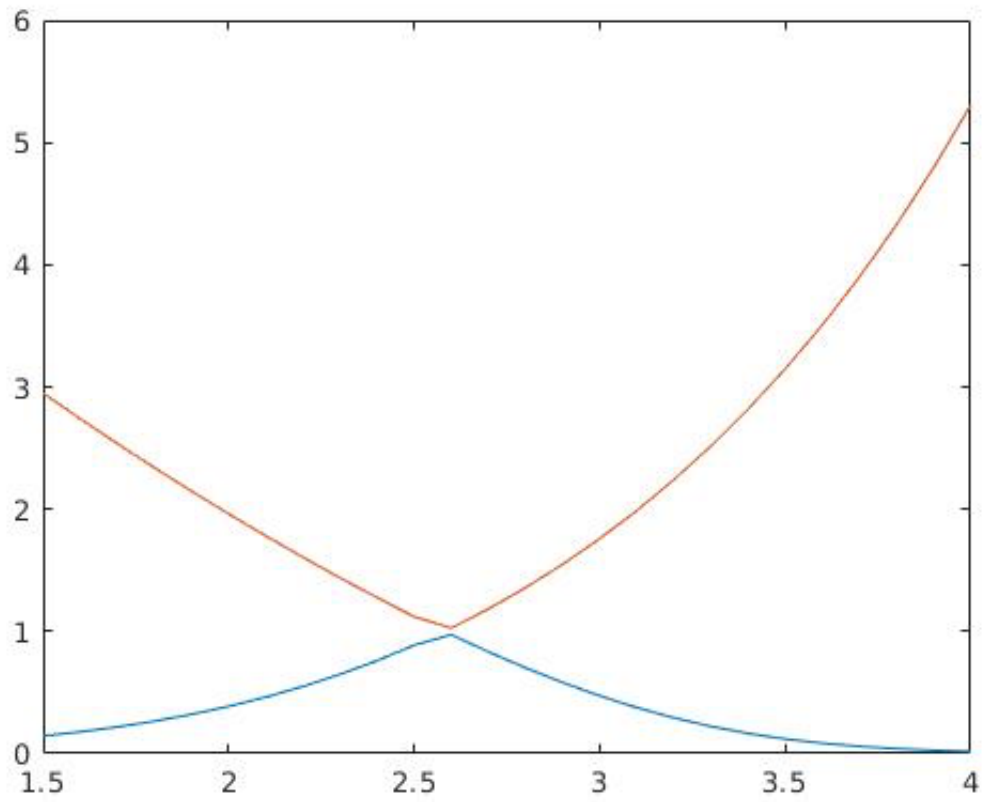
$$\therefore I = \frac{-4k(\epsilon)^2}{\ln(2)} + k$$

$$\therefore I = a - b\epsilon^2 \text{ where } a = k \text{ and } b = \frac{4k}{\ln(2)}$$

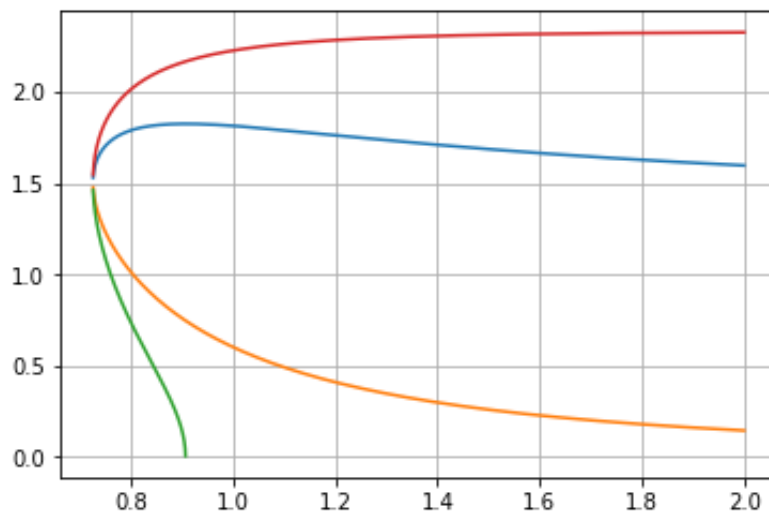
Q1.c



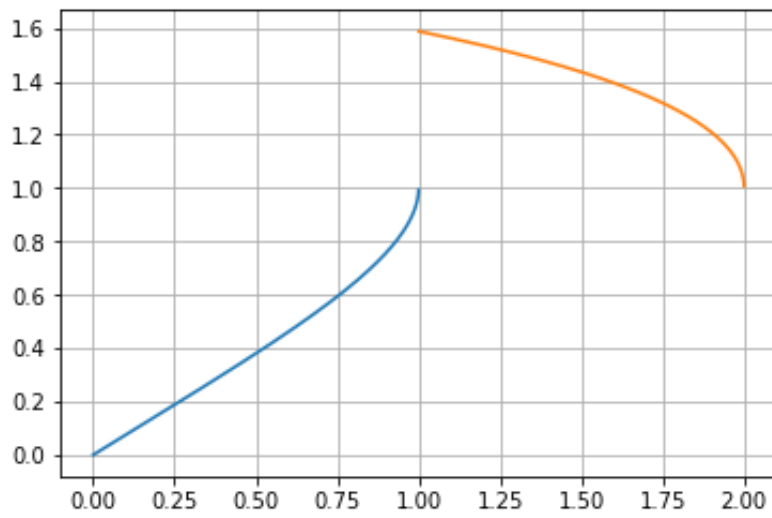
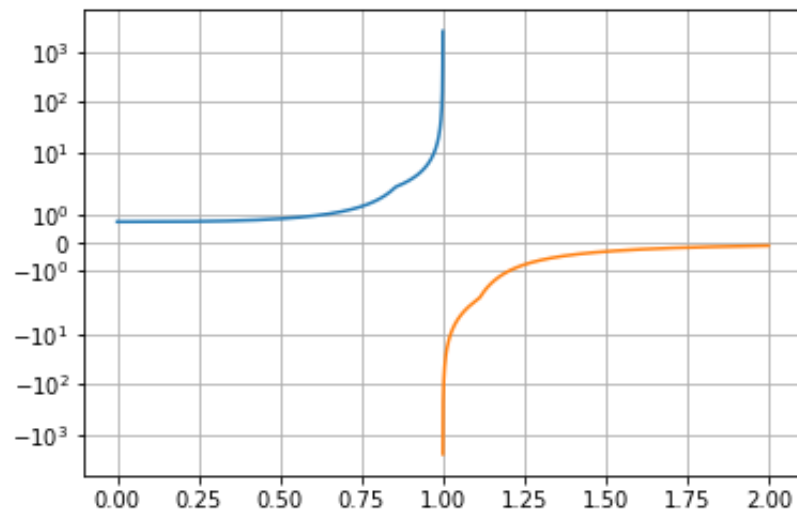
Q2



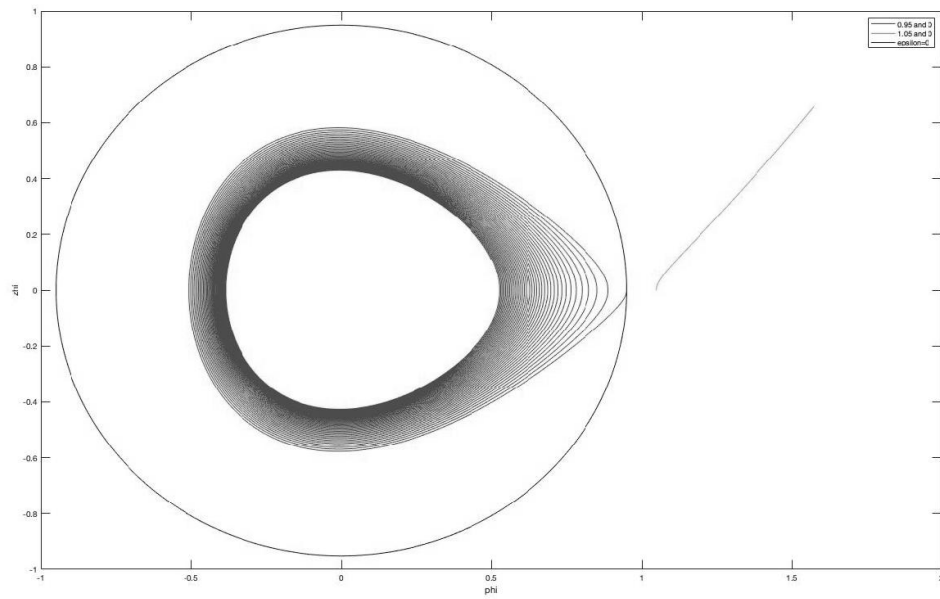
Question 3



Question 4



Question 5: The Lienard System



The closed ellipse is for $\text{Epsilon} = 0$. The others are for $\text{Epsilon} = 1$. $(0.95, 0)$ gives the spiral and $(1.05, 0)$ gives the open curve.