

$$A = \begin{bmatrix} 0 & 1 \\ -g & -\frac{b}{m} \end{bmatrix}$$

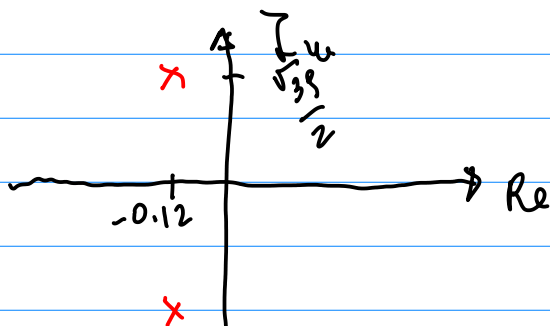
$$\begin{aligned} [\lambda I - A] &= \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix} - \begin{bmatrix} 0 & 1 \\ -g & -\frac{b}{m} \end{bmatrix} = \\ &= \begin{bmatrix} \lambda & -1 \\ g & \lambda + \frac{b}{m} \end{bmatrix} \end{aligned}$$

$$\begin{aligned} \begin{vmatrix} \lambda & -1 \\ g & \lambda + \frac{b}{m} \end{vmatrix} &= \lambda \left(\lambda + \frac{b}{m} \right) + g = \\ &= \lambda^2 + \frac{b}{m} \lambda + g \end{aligned}$$

$$\lambda = \frac{-\frac{b}{m} \pm \sqrt{\frac{b^2}{m^2} - 4g}}{2} = \frac{-0.24 \pm \sqrt{-39}}{2}$$

$$b = 6 \quad m = 25 \quad \frac{b}{m} = 0.24$$

$$\lambda = \frac{-0.24}{2} \pm i \frac{\sqrt{39}}{2} = \boxed{-0.12} \pm i \frac{\sqrt{39}}{2}$$



$$T_A \approx \frac{3}{0.12} = 25 \text{ s}$$

$$A = \begin{bmatrix} -\frac{b}{M} & 0 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} -0.24 & 0 \\ 1 & 0 \end{bmatrix}$$

$$[\lambda I - A] = \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix} - \begin{bmatrix} -0.24 & 0 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} \lambda + 0.24 & 0 \\ -1 & \lambda \end{bmatrix}$$

$$\begin{vmatrix} \lambda + 0.24 & 0 \\ -1 & \lambda \end{vmatrix} = (\lambda + 0.24)\lambda$$

$$\lambda = 0$$

$$\lambda = -0.24$$

$$\tau_A = \frac{3}{|-0.24|} = \frac{3}{0.24} = 12.5$$