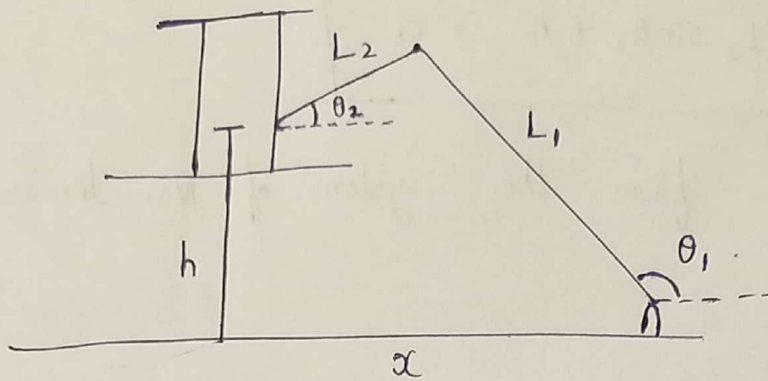## 2.)

a)

Develop the non linear system of equations for the
Position of the bars.

$$\bar{L}_1 + \bar{L}_2 + \bar{h} + \bar{x} = 0 \quad \left(\text{Vector Addition}\right)$$

$$\bar{L}_1 = L_1 \cdot e^{i\theta_1} \quad , \quad \bar{L}_2 = L_2 \cdot e^{i\theta_2}$$

$$\bar{h} = h \cdot e^{i\pi/2} \quad , \quad \bar{x} = x \cdot e^{i\theta}$$

Therefore, $\quad L_1 e^{i\theta_1} + L_2 e^{i\theta_2} + h \cdot e^{i\pi/2} + x \cdot e^{i\theta} = 0.$

$$L_1\left(\cos\theta_1 + i\sin\theta_1\right) + L_2\left(\cos\theta_2 + i\sin\theta_2\right) +$$

$$h\left(\cos\frac{\pi}{2} + i\sin\left(\frac{\pi}{2}\right)\right) + x\left(\cos\theta + i\sin\theta\right) = 0.$$

$$\left[L_1\left(\cos\theta_1\right) + L_2\cos\theta_2 + h\cos\frac{\pi}{2} + x\cos\theta\right] +$$

$$i\left[L_1\sin\theta_1 + L_2\sin\theta_2 + h\sin\frac{\pi}{2} + x\sin\theta\right] = 0$$

$$\left[L_1\cos\theta_1 + L_2\cos\theta_2 + x\right] + i\left[L_1\sin\theta_1 + L_2\sin\theta_2 + h\right] = 0$$

$$\Rightarrow \boxed{\begin{array}{l} L_1 \cos\theta_1 + L_2 \cos\theta_2 + x = 0 \\[2mm] L_1 \sin\theta_1 + L_2 \sin\theta_2 + h = 0 \end{array}}$$

These form the system of Non-linear equations