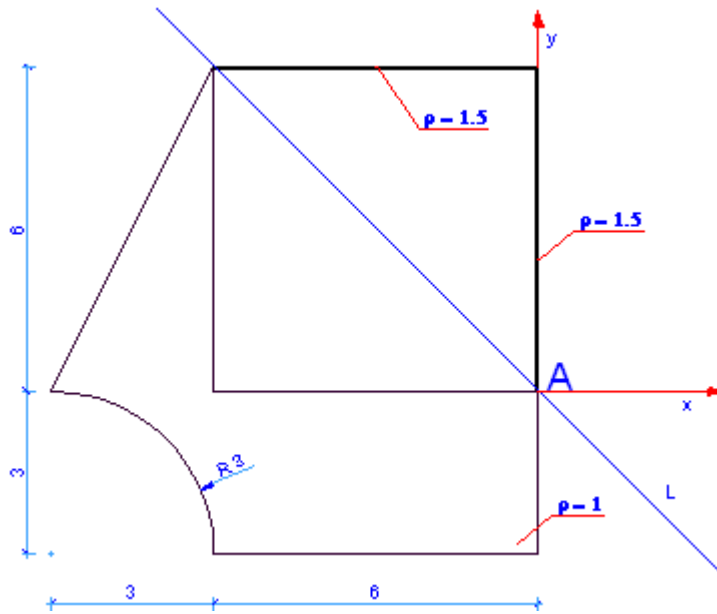


- Wyznaczyć: 1. główne osie i momenty bezwładności w punkcie A
2. moment bezwładności względem prostej L



$$I_x := \frac{6 \cdot 3^3}{3} + \frac{3 \cdot 6^3}{12} + \frac{3^4}{3} - \left[\frac{\pi \cdot 3^4}{16} - \frac{\pi \cdot 3^2}{4} \cdot \left(\frac{4 \cdot 3}{3 \pi} \right)^2 + \frac{\pi \cdot 3^2}{4} \cdot \left(3 - \frac{4 \cdot 3}{3 \pi} \right)^2 \right] + \left(\frac{6^3}{3} \cdot 1.5 + 6 \cdot 1.5 \cdot 6^2 \right) \cdot 1$$

$$I_y := \frac{3 \cdot 6^3}{3} + \frac{6 \cdot 3^3}{36} + \frac{3 \cdot 6}{2} \cdot 7^2 + \frac{3^4}{12} + 3^2 \cdot 7.5^2 - \left[\frac{\pi \cdot 3^4}{16} - \frac{\pi \cdot 3^2}{4} \cdot \left(\frac{4 \cdot 3}{3 \pi} \right)^2 + \frac{\pi \cdot 3^2}{4} \cdot \left(9 - \frac{4 \cdot 3}{3 \pi} \right)^2 \right] + \left(\frac{6^3}{3} \cdot 1.5 \right) \cdot 1$$

$$I_{xy} := \frac{3^2 \cdot 6^2}{4} + \frac{3^2 \cdot 6^2}{72} + \frac{3 \cdot 6}{2} \cdot (-7) \cdot 2 + 3^2 \cdot (-7.5) \cdot (-1.5) \dots$$

$$+ - \left[\frac{3^4}{8} - \frac{\pi \cdot 3^2}{4} \cdot \left(\frac{4 \cdot 3}{3 \pi} \right)^2 + \frac{\pi \cdot 3^2}{4} \cdot \left(-9 + \frac{4 \cdot 3}{3 \pi} \right) \cdot \left(-3 + \frac{4 \cdot 3}{3 \pi} \right) \right] + 6 \cdot 1.5 \cdot 6 \cdot (-3)$$

$$I_x = 541.478 \quad I_y = 856.04 \quad I_{xy} = -194.227$$

$$I_1 := \frac{I_x + I_y}{2} + \sqrt{\left(\frac{I_x - I_y}{2} \right)^2 + I_{xy}^2} \quad I_2 := \frac{I_x + I_y}{2} - \sqrt{\left(\frac{I_x - I_y}{2} \right)^2 + I_{xy}^2} \quad I_1 = 948.682 \quad I_2 = 448.837$$

$$\alpha_1 := \text{atan} \left(\frac{I_{xy}}{I_y - I_1} \right) \cdot \frac{180}{\pi} \quad \alpha_2 := \text{atan} \left(\frac{I_{xy}}{I_y - I_2} \right) \cdot \frac{180}{\pi} \quad \alpha_1 = 64.5 \quad \alpha_2 = -25.5 \quad |\alpha_1| + |\alpha_2| = 90$$

$$\alpha := 135 \cdot \frac{\pi}{180} \quad \alpha = 2.356$$