

SOLUTION TO #1.4

(OLD #5)

$$A: x_A = \frac{1}{2} \left( \frac{M}{P_x} \right) = \left( \frac{1}{2} \right) \frac{P_x x^0 + P_y y^0}{P_x} = \left( \frac{1}{2} \right) \left( x^0 + \frac{1}{\rho} y^0 \right)$$

$$B: x_B = \frac{1}{\rho}$$

$$\begin{aligned} P_x &= 1 \\ P_x x + y &= P_y y^0 = 3P_y = 3 \\ P_x x + y &= 3 \\ y &= 3 - P_x x = 3 - 1 = 2 \end{aligned}$$

$$\begin{aligned} x_A + x_B &= \frac{1}{2} \left( x_A^0 + \frac{1}{\rho} y_A^0 \right) + \frac{1}{\rho} \\ &= \frac{1}{2} x_A^0 + \left( \frac{1}{2} y^0 + 1 \right) \frac{1}{\rho} \end{aligned}$$

$$x_A + x_B = x_A^0 + x_B^0 = 8 = \left( \frac{1}{2} \right) (8) + (1) \frac{1}{\rho} = 8$$

$$4 + \frac{1}{\rho} = 8 \quad ; \quad \frac{1}{\rho} = 4 \quad ; \quad \boxed{\rho = \frac{1}{4}}$$

$$\rho = \frac{1}{4}: \quad x_A = \left( \frac{1}{2} \right) (8) = 4, \quad x_B = \frac{1}{\rho} = 4 \quad x_A + x_B = 8 \quad \text{OK}$$

$$\left. \begin{aligned} y_A &= \frac{1}{2} \left( \frac{M}{P_y} \right) = \left( \frac{1}{2} \right) (P_x x_A) = \left( \frac{1}{2} \right) \left( \frac{1}{4} \right) (8) = 1 \\ y_B &= M - P_x x = (1)(3) - \left( \frac{1}{4} \right) (4) = 3 - 1 = 2 \end{aligned} \right\} y_A + y_B = 3 \quad \text{OK}$$

$$\rho = \frac{1}{4} \quad ; \quad (x_A, y_A) = (4, 1), \quad (x_B, y_B) = (4, 2)$$