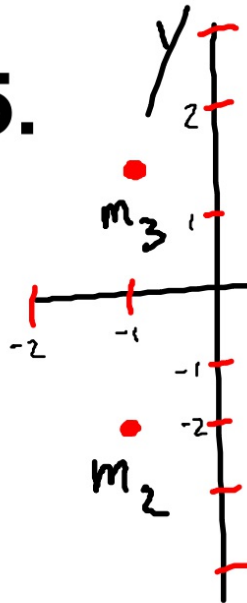


5.



$$X_{com} = ? \quad Y_{com} = ?$$

$$X_{com} = \frac{m_1 x_1 + m_2 x_2 + \dots}{M}$$

$$X_{com} = \frac{(4m)(L) + (8m)(-L) + (6m)(-L) + (4m)(2L)}{22m}$$

$$X_{com} = \frac{mL(-2)}{22m} = \frac{-2L}{22}$$

let $m_1 = 4m$

$m_2 = 8m$

$m_3 = 6m$

$m_4 = 4m$

$$X_{com} = -0.091L$$

$$X_{com} = -0.091(0.05m)$$

$$X_{com} = -0.0045m$$

$$Y_{com} = ?$$

$$Y_{com} = \frac{(4m)(-3L) + (8m)(-2L) + (6m)(1.5L) + (4m)(2.5L)}{22m}$$

$$Y_{com} = \frac{-12mL - 16mL + 9mL + 10mL}{22m}$$

$$Y_{com} = \frac{-9mL}{22} = -0.41L = Y_{com}$$

$$= -0.41(.05)$$

$$Y_{com} = -0.0205m$$

3. $x_{\text{com}} = ?$ $x_{\text{com}} = -\frac{d_3}{2} = -6.5\text{cm}$
 (by symmetry!)

b) $y_{\text{com}} = ?$

$$y_{\text{com}} = \frac{m_1 y_1 + m_2 y_2}{m_1 + m_2}$$

$$= \frac{(7.85)\left(\frac{d_1}{2}\right) + (2.70)\left(\frac{3d_1}{2}\right)}{10.55}$$

$$= 0.7559 d_1 = 0.083\text{m} = 8.3\text{cm}$$

$z_{\text{com}} = ?$

by symmetry, $z_{\text{com}} = \frac{d_2}{2} = 1.4\text{cm} = 0.014\text{m}$

So, $\mathbf{r}_{\text{com}} = -6.5\text{cm}\hat{i} + 8.3\text{cm}\hat{j} + 1.4\text{cm}\hat{k}$