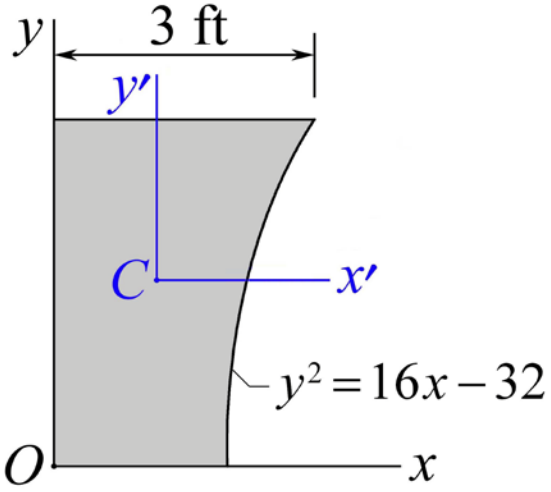
MEEG 2003 Quiz #7.m22

A shaded area is shown, where $C(\bar{x},\bar{y})$ is its centroid. For this shaded area, determine *(a)* the value of $\bar{x}$, *(b)* the value of $\bar{y}$, *(c)* the moment of inertia I_y, *(d)* the moment of inertia $\bar{I}_{y'}$, *(e)* the radius of gyration $\bar{k}_{y'}$.



$$A = \frac{28}{3}\ \text{ft}^2 = 9.\dot{3}\ \text{ft}^2 \quad ①$$

$$\bar{x} = \frac{83}{70} = 1.1857 \qquad \bar{x} = 1.186\ \text{ft} \quad ②$$

$$\bar{y} = \frac{15}{7} = 2.143 \qquad \bar{y} = 2.14\ \text{ft} \quad ②$$

$$I_y = \frac{1868}{105} = 17.7905 \qquad I_y = 17.79\ \text{ft}^4 \quad ②$$

$$\bar{I}_{y'} = I_y - A\bar{x}^2 = 4.669 \qquad \bar{I}_{y'} = 4.67\ \text{ft}^4 \quad ②$$

$$\bar{k}_{y'} = \sqrt{\bar{I}_{y'} / A} = 0.70725 \qquad \bar{k}_{y'} = 0.707\ \text{ft} \quad ①$$