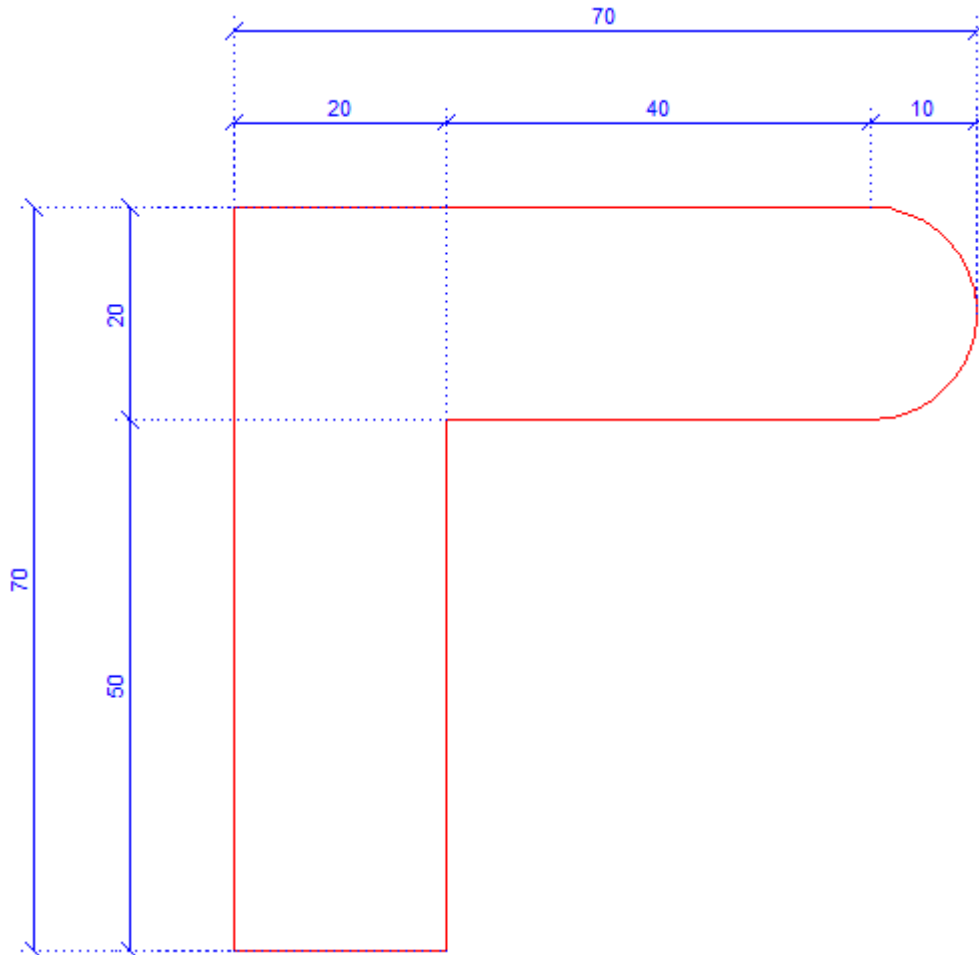


Problem 6

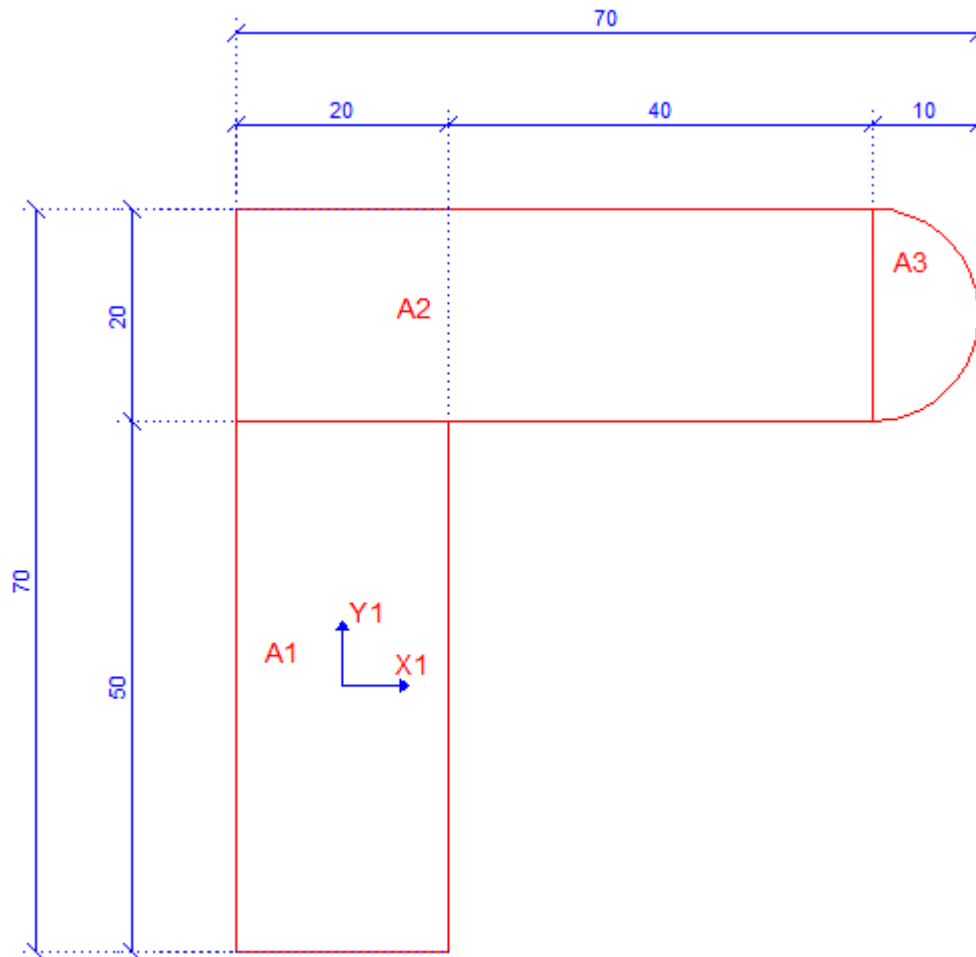
Determine the location of centroid of the given area



SOL.

1- Assume x and y axis

2- Divide the area to areas with simple shape



3- Find area properties

$$A_1 = 20 \times 50 = 1000 \text{ mm}^2$$

$$A_2 = 60 \times 20 = 1200 \text{ mm}^2$$

$$A_3 = \frac{\pi \times 20^2}{8} = 157.08 \text{ mm}^2$$

$$A_t = 1000 + 1200 + 157.08 = 2357.08 \text{ mm}^2$$

$$x_1 = 0, y_1 = 0$$

$$x_2 = \frac{20}{2} + \frac{40}{2} = 30 \text{ mm}, y_2 = \frac{50}{2} + \frac{20}{2} = 35 \text{ mm}$$

$$x_3 = \frac{20}{2} + 40 + \frac{2 \times 20}{3 \times \pi} = 54.244 \text{ mm}, y_3 = \frac{50}{2} + \frac{20}{2} = 35 \text{ mm}$$

$$\bar{x} = \frac{\sum A_i x_i}{\sum A_i} = \frac{1000 \times 0 + 1200 \times 30 + 157.08 \times 54.244}{2357.08} = 18.888 \text{ mm}$$

$$\bar{y} = \frac{\sum A_i y_i}{\sum A_i} = \frac{1000 \times 0 + 1200 \times 35 + 157.08 \times 35}{2357.089} = 20.151 \text{ mm}$$

