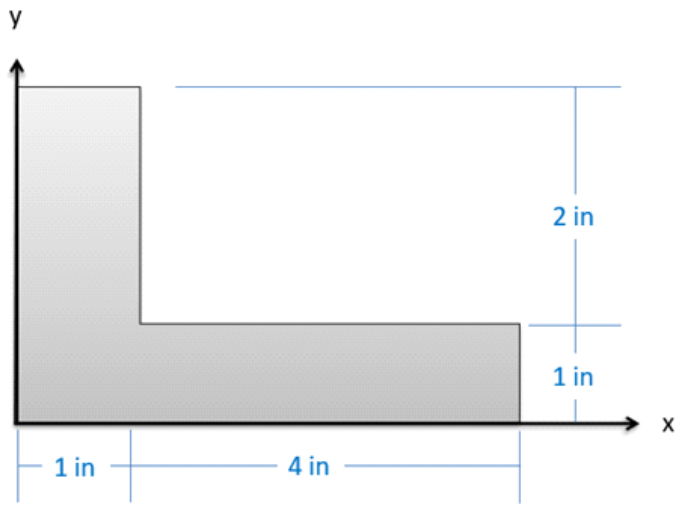
Question 3

Find the x and y coordinates of the centroid of the shape shown below.



$$\bar{X} = \frac{\int_0^1 (dA_1)(x) + \int_1^3 (dA_2)(x)}{\text{Area}} = \frac{\int_0^1 (3)\,dx\,(x) + \int_1^5 (1)\,dx\,(x)}{(1)(3)+(4)(1)}$$

$$\bar{X} = \frac{\left|_0^1 \left(\frac{3}{2}x^2\right) + \right|_1^5 \left(\frac{1}{2}x^2\right)}{7} = \frac{\left(\left(\frac{3}{2}(1)^2\right)-(0)\right)+\left(\left(\frac{1}{2}(5)^2\right)-\left(\frac{1}{2}(1)^2\right)\right)}{7}$$

$$\bar{X} = \frac{1.5 + 12}{7} \approx 1.93$$

$$\bar{Y} = \frac{\int_0^1 (dA_1)(y) + \int_1^3 (dA_2)(y)}{\text{Area}} = \frac{\int_0^1 (5)\,dy\,(y) + \int_1^3 (1)\,dy\,(y)}{7}$$

$$\bar{Y} = \frac{\left|_0^1 \frac{5}{2}y^2 + \right|_1^3 \frac{1}{2}y^2}{7} = \frac{\left(\left(\frac{5}{2}(1)^2\right)-(0)\right)+\left(\left(\frac{1}{2}(3)^2\right)-\left(\frac{1}{2}(1)^2\right)\right)}{7}$$

$$\bar{y} = \frac{2.5 + 4}{7} \approx .93$$

Centroid at $(1.93, .93)$ in