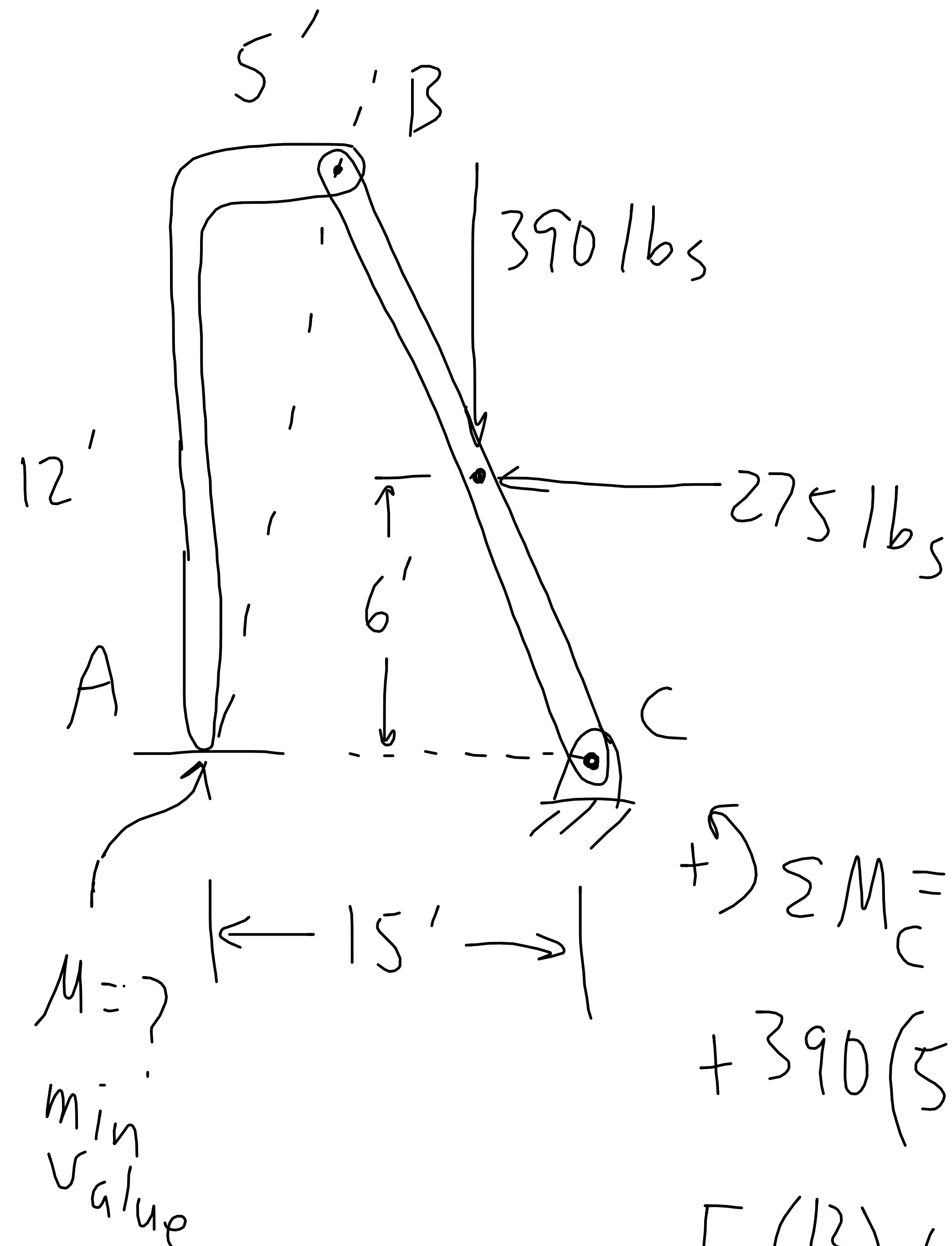
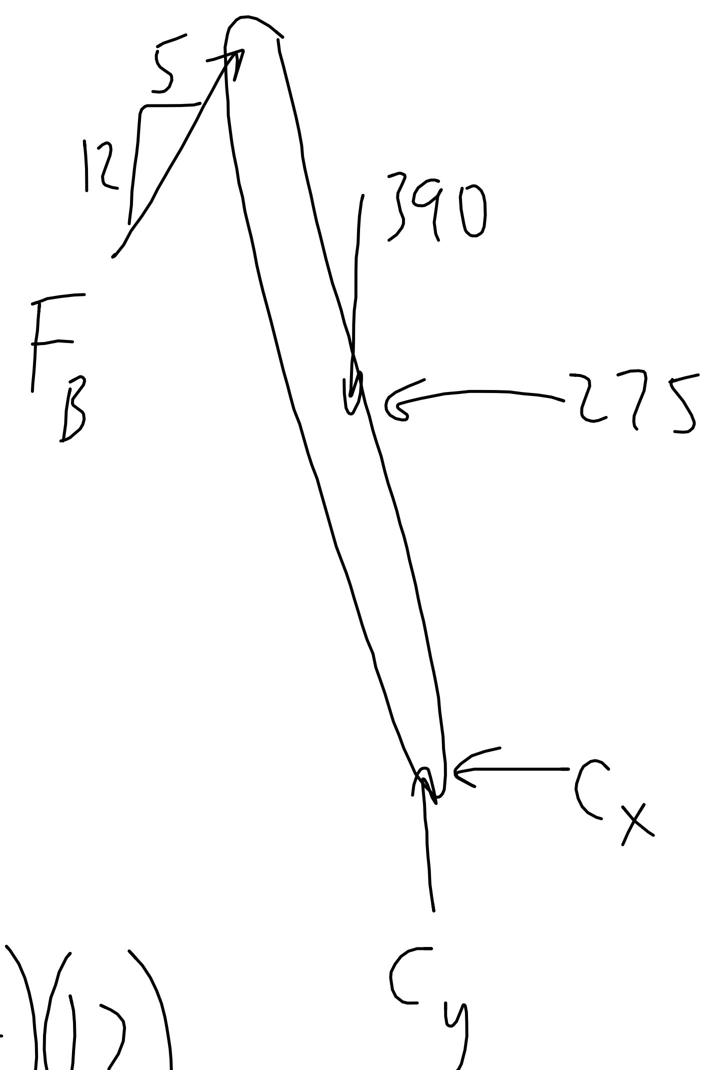
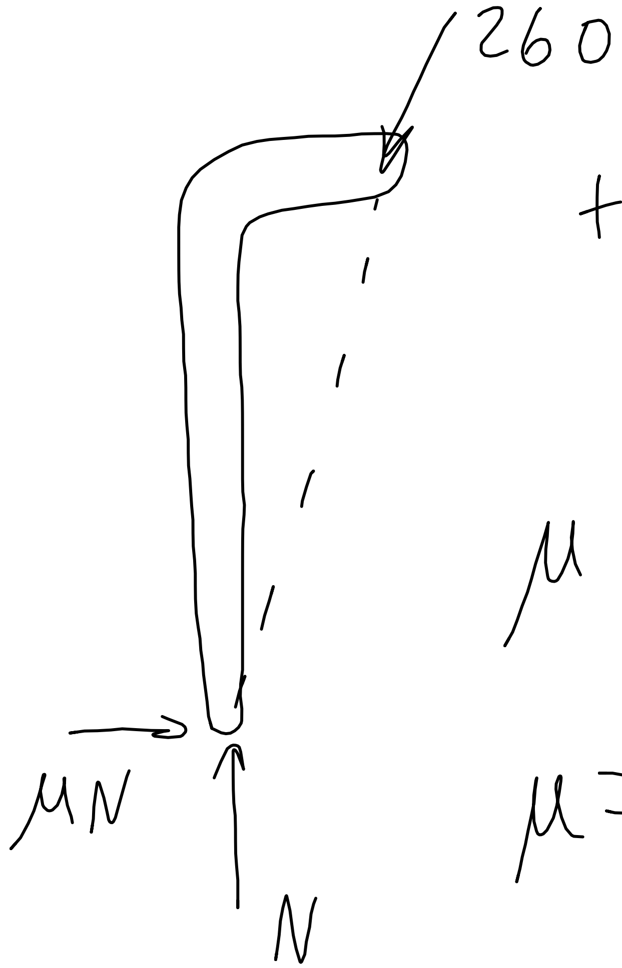


Long way



$$\circlearrowleft + \Sigma M_C = 275(6) + 390(5) - F_B\left(\frac{5}{13}\right)(12) - F_B\left(\frac{12}{13}\right)(10) = 0$$

$$F_B = 260 \text{ lbs}$$

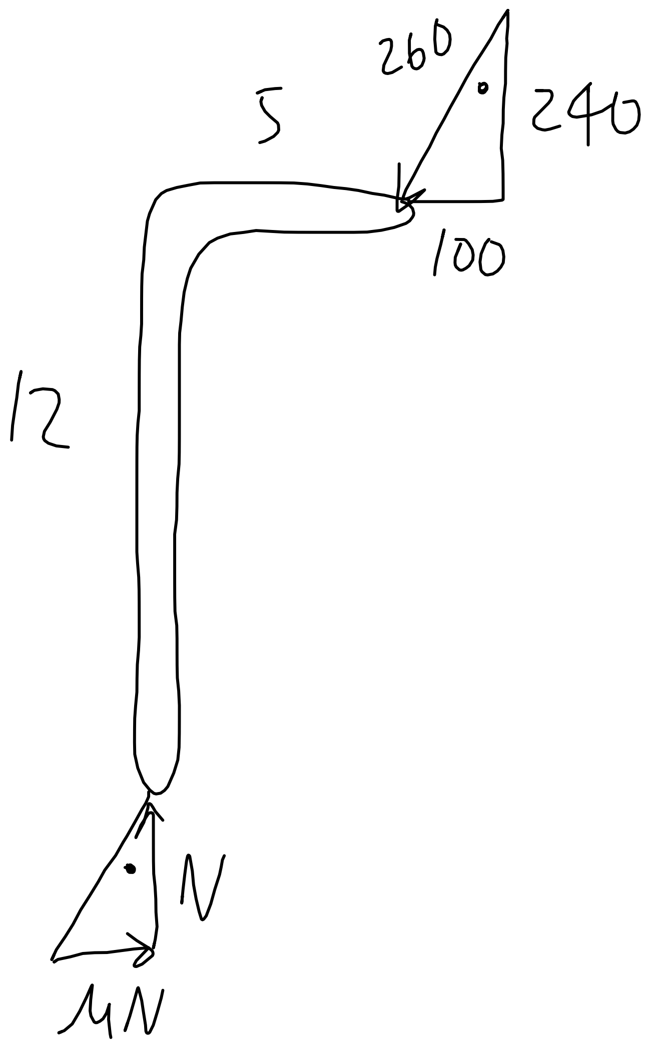


$$+\uparrow \Sigma F_y = N - 260\left(\frac{12}{13}\right) = 0 \qquad N = 240$$

$$\mu(240) = 260\left(\frac{5}{13}\right)$$

$$\mu = \frac{260(5)}{240(13)} = .417$$

Elegant way



$$\frac{\mu \cancel{N}}{\cancel{N}} = \frac{100}{240} = .417$$

Ch 9 Centroids & Moments of Inertia

dist function $\Rightarrow$ $f(x) = \frac{dm}{dx}$

$M = \int \frac{dm}{dx}\, dx = \int dm$ ✓ 0^{th} moment of $f(x)$

really $\int x^0 f(x)\, dx$

Historical aside....

1, 2, 2, 3, 3, 3, 3, 6

$$avg = \frac{1*1 + 2*2 + 3*4 + 6*1}{1 + 2 + 4 + 1}$$

"Avg position"

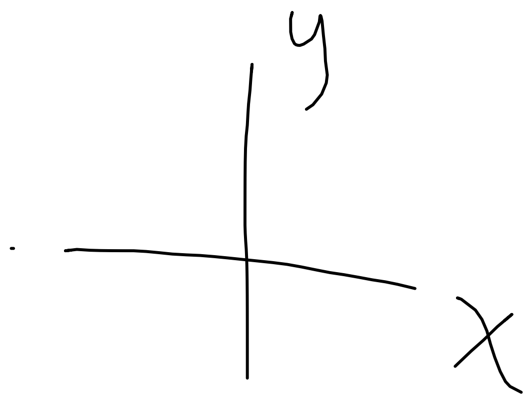
x_c centroid

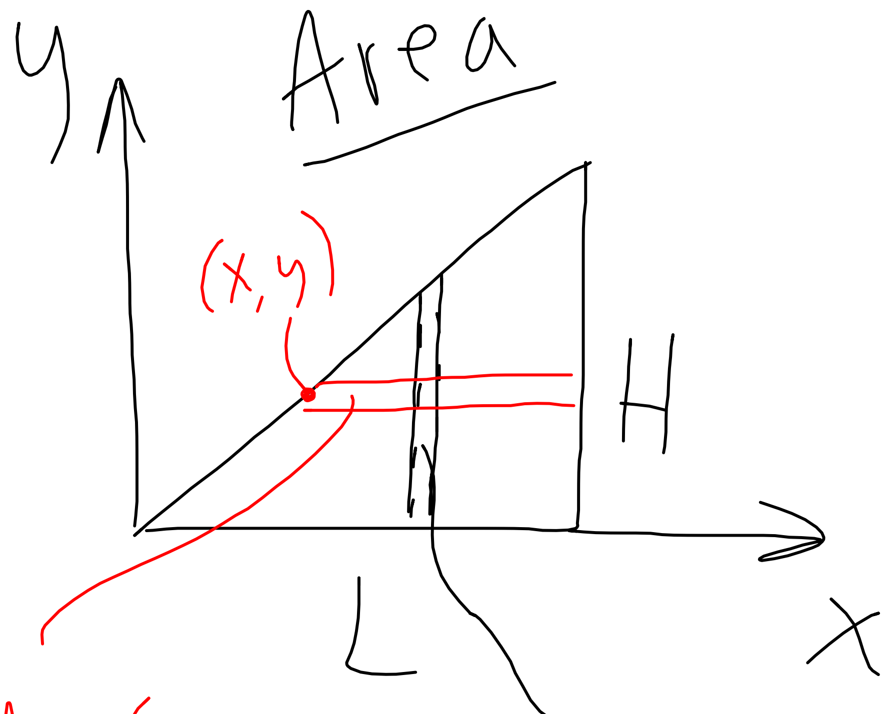
$$\frac{\int x\, f(x)\, dx}{\int f(x)\, dx} = \frac{\int x\, dm}{\int dm} = \frac{\int x\, dm}{M}$$

2^{nd} moment of mass distribution

$$\int x^2 \, dm \Rightarrow I_y$$

moment of inertia





$$dA = \frac{H}{L}\, x\, dx$$

$$dA = (L - x)\, dy$$

$$= \left(L - \frac{L}{H}\, y\right) dy$$

$$\int y\, dA = \int_0^H \left(L - \frac{L}{H}\, y\right) y\, dy$$

$$= \frac{LH^2}{2} - \frac{LH^2}{3} = \frac{LH^2}{6}$$

$$x_c = \frac{\int x\, dA}{\int dA} \qquad \int dA = \frac{1}{2} L H$$

$$= \frac{\int_0^L x \,\frac{H}{L}\, x\, dx}{\frac{1}{2} L H}$$

$$= \frac{\frac{H}{L}\,\frac{L^3}{3}}{\frac{1}{2} L H} = \frac{2}{3} L$$

$$\therefore \; y_{cm} = \frac{\int y \, dA}{\int dA} = \frac{LH^2/6}{\frac{1}{2}LH} = \frac{H}{3} \checkmark$$

n use vertical strip & let y be y_c for strip

$$y_c = \frac{\int y \, dA}{\int dA} = \frac{\int_0^L \frac{\frac{H}{L}x}{2} \, dA}{\frac{1}{2}HL} = \frac{\int_0^L \frac{\frac{H}{L}x}{2} \frac{H}{L}x \, dx}{\frac{1}{2}HL} = \frac{H}{L^3} \frac{L^3}{3}$$

$$= \frac{H}{3}$$