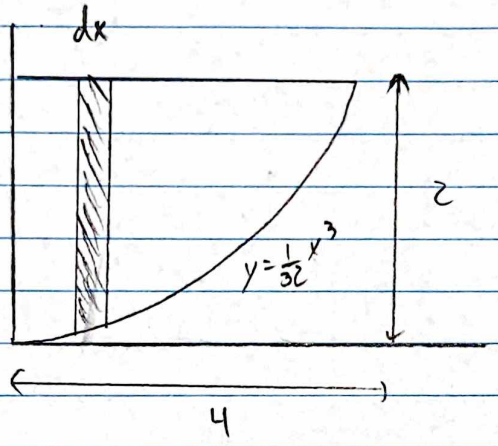
Solutions: 21-5-9.1-MR-01

$y = \frac{2}{4^3} x^3 \rightarrow y = \frac{1}{32} x^3$



$y = \frac{1}{32} x^3 \rightarrow x = \sqrt[3]{32y}$

$\bar{x} = \frac{\int_a^b dM}{\int_a^b dm} =$

$dm = K\,dA$

$dm = K(y_2 - y_1)\,dx$

$m = K \int_0^4 \left(2 - \frac{1}{32} x^3\right) dx$

$m = K\left(2x - \frac{1}{32(4)} x^4\right)\Big|_0^4 \rightarrow m = K\,6 \Rightarrow$ Area = 6

$dM = dm\,x$

$dM = Kx(y_2 - y_1)\,dx$

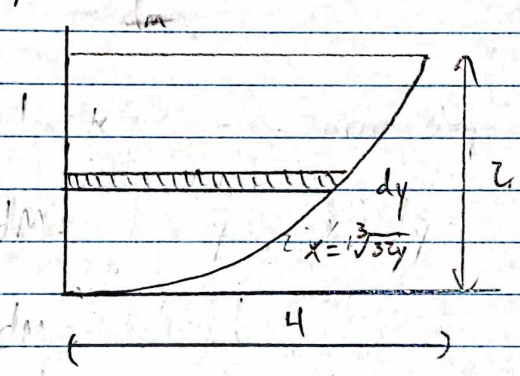
$M = K \int_0^4 x\left(2 - \frac{1}{32} x^3\right) dx$

$$M = k\int_0^4 \left(2x - \frac{1}{32}x^4\right)dx$$

$$M = k\left(\frac{2x^2}{2} - \frac{1}{32(5)}x^5\right)\Big|_0^4 \quad \rightarrow \quad M = k\,9.6$$

$$\bar{x} = \frac{k\,9.6}{k6} \Rightarrow \boxed{\bar{x} = 1.6}$$

$\bar{y}$



$m = k6 \rightsquigarrow$ area is the same (6)

$$M = k\int y\,(x_2 - x_1)\,dy$$

$$M = k\int_0^2 y\left(32^{1/3}y^{1/3}\right)dy$$

$$M = 32^{1/3}k\int_0^2 y^{\frac{4}{3}}\,dy$$

$$M = 32^{1/3}k\left(y^{\frac{7}{3}}\right)\Big|_0^2 \quad \rightarrow \quad M = k\,6.85$$

$$\bar{y} = \frac{M}{m} = \frac{k\,6.85}{k6} \Rightarrow \boxed{\bar{y} = 1.14}$$