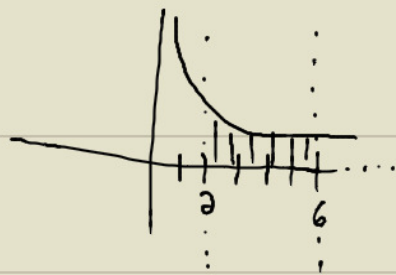


4. $y = \frac{1}{x}$, $y=0$, $x=2$, $x=6$, $\rho = kx^2$



$$m = \int_{x=2}^{x=6} \int_{y=0}^{y=\frac{1}{x}} kx^2 dy dx$$

$$m = k \int_{x=2}^{x=6} [x^2 y]_{y=0}^{y=\frac{1}{x}} dx$$

$$m = k \int_{x=2}^{x=6} x^2 \left[\frac{1}{x} - 0 \right] dx$$

$$m = k \int_{x=2}^{x=6} x dx$$

$$m = k \left[\frac{1}{2} x^2 \right]_{x=2}^{x=6}$$

$$m = \frac{1}{2} k [6^2 - 2^2]$$

$$m = \frac{1}{2} k [36 - 4]$$

$$m = 16k$$

$$M_x = \int_{x=2}^{x=6} \int_{y=0}^{y=\frac{1}{x}} y (kx^2) dy dx$$

$$M_x = k \int_{x=2}^{x=6} \left[\frac{1}{2} y^2 x^2 \right]_{y=0}^{y=\frac{1}{x}} dx$$

$$M_x = \frac{1}{2} k \int_{x=2}^{x=6} x^2 \left[\left(\frac{1}{x}\right)^2 - (0)^2 \right] dx$$

$$M_x = \frac{1}{2} k \int_{x=2}^{x=6} 1 dx$$

$$M_x = \frac{1}{2} k [x]_{x=2}^{x=6}$$

$$M_x = \frac{1}{2} k [6 - 2]$$

$$M_x = 2k$$

$$M_y = \int_{x=2}^{x=6} \int_{y=0}^{y=\frac{1}{x}} x (kx^2) dy dx$$

$$M_y = k \int_{x=2}^{x=6} \int_{y=0}^{y=\frac{1}{x}} x^3 dy dx$$

$$M_y = k \int_{x=2}^{x=6} [x^3 y]_{y=0}^{y=\frac{1}{x}} dx$$

$$M_y = k \int_{x=2}^{x=6} x^3 \left[\frac{1}{x} - 0 \right] dx$$

$$M_y = k \int_{x=2}^{x=6} x^2 dx$$

$$M_y = k \cdot \left[\frac{1}{3} x^3 \right]_{x=2}^{x=6}$$

$$= \frac{1}{3} k [6^3 - 2^3]$$

$$= \frac{1}{3} k [216 - 8]$$

$$M_y = \frac{208}{3} k$$

$$(\bar{x}, \bar{y}) = \left(\frac{M_y}{m}, \frac{M_x}{m} \right)$$

$$= \left(\frac{\frac{208}{3} k}{16k}, \frac{2k}{16k} \right)$$

$$= \left(\frac{208}{48}, \frac{1}{8} \right)$$

$$= \left(\frac{52}{12}, \frac{1}{8} \right)$$

$$= \left(\frac{13}{3}, \frac{1}{8} \right)$$