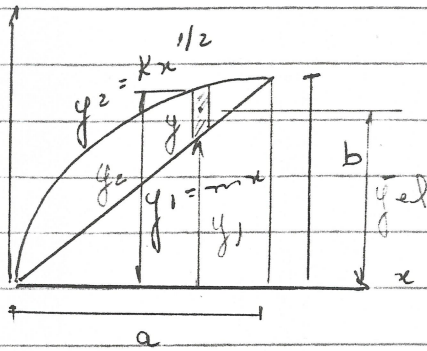


5.35. Determine por integração direta, o centroide.



Solução

$$x=a \quad y=b$$

$$y_2 = kx^{1/2}$$

$$b = k a^{1/2} \Rightarrow k = \frac{b}{\sqrt{a}}$$

$$y_1 = mx \Rightarrow$$

$$b = ma \Rightarrow m = \frac{b}{a}$$

Elem. difere. vertical

$$\bar{x}_{el} = x$$

$$\bar{y}_{el} = \frac{y_2 - y_1}{2} + y_1 = \frac{y_1 + y_2}{2}$$

$$dA = (y_2 - y_1) dx$$

$$y_2 = \frac{b}{\sqrt{a}} x^{1/2}$$

$$y_1 = \frac{b}{a} x$$

$$dA = \left( \frac{b}{\sqrt{a}} x^{1/2} - \frac{b}{a} x \right) dx$$

$$A = \int dA = \int_0^a \frac{b}{\sqrt{a}} x^{1/2} dx - \int_0^a \frac{b}{a} x dx$$

$$= \frac{b}{\sqrt{a}} \frac{x^{3/2}}{3/2} \Big|_0^a - \frac{b}{a} \frac{x^2}{2} \Big|_0^a$$

$$A = \frac{2b\sqrt{a^3}}{3\sqrt{a}} = \frac{ab}{2} = \frac{2ba}{3} - \frac{ab}{2} = \frac{4ba - 3ab}{6}$$

$$A = \frac{ab}{6}$$

$$\bar{x}A = \int \bar{x}_{el} dA = \int_0^a x \left( \frac{b}{\sqrt{a}} x^{1/2} - \frac{b}{a} x \right) dx$$