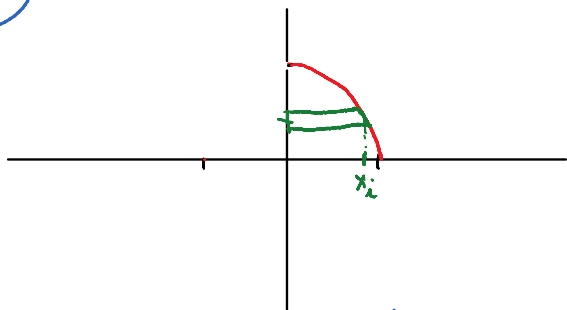


8.2

#14



$$S_i = 2\pi r L = 2\pi r ds$$

$$= 2\pi x_i \sqrt{1+4x_i^2}$$

$$S = \frac{2\pi}{8} \int_0^1 8x \sqrt{1+4x^2} dx$$

$$u = 1+4x^2$$

$$du = 8x$$

Time-out

$$\int \sqrt{u} du$$

$$\frac{2}{3} u^{\frac{3}{2}}$$

$$\frac{2}{3} (1+4x^2)^{\frac{3}{2}} + C$$

Time-in

$$S = \frac{\pi}{4} \cdot \frac{2}{3} \left[ (1+4x^2)^{\frac{3}{2}} \right]_0^1$$

$$= \frac{\pi}{6} [5^{\frac{3}{2}} - 1]$$

$$= \frac{\pi}{6} [5\sqrt{5} - 1]$$

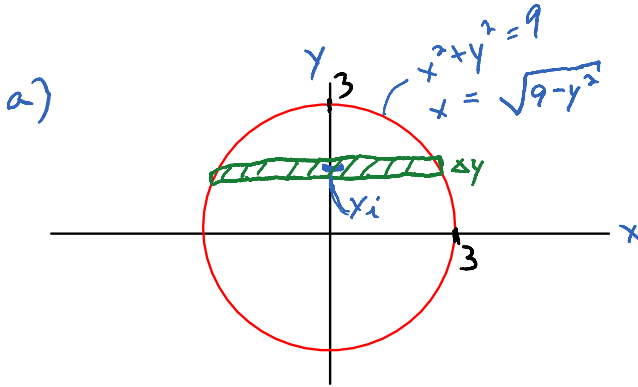
8.3

(in)

$$y_2 \quad x^2 + y^2 = 9$$

8.3

(12)



$$F_i = WDA$$

$$= 64.6 (3 - y_i) 2\sqrt{9 - y_i^2} \Delta y$$

$$F = 129.2 \int_{-3}^3 (3 - y) \sqrt{9 - y^2} dy$$

$$F = 129.2 \left[ \overbrace{3 \int_{-3}^3 \sqrt{9 - y^2} dy}^{\text{area of semicircle}} - \int_{-3}^3 \underbrace{y \sqrt{9 - y^2}}_{\text{odd fctn}} dy \right]$$

$$= 129.2 \left[ 3 \cdot \frac{\pi(3)^2}{2} - 0 \right]$$

$$= 129.2 \left( \frac{27\pi}{2} \right)$$

$$= 1744.2 \pi \text{ lbs}$$

$$\approx 5479.6 \text{ lbs}$$

b)  $F_i = WDA$

$$= 64.6 (0 - y_i) 2\sqrt{9 - y_i^2} \Delta y$$

$$F = \frac{129.2}{-2} \int_{-3}^0 (-2y) \sqrt{9 - y^2} dy$$

$$= \frac{-129.2}{-2} \cdot \frac{2}{3} \left[ (9 - y^2)^{\frac{3}{2}} \right]_{-3}^0$$

$$= \frac{129.2}{2} \left[ 9^{\frac{3}{2}} - 0 \right]$$

$$= \frac{129.2 (27)}{3}$$
$$= 1162.8 \text{ lbs}$$