

§ 8.2 #1 Set up, but do not ~~evaluate~~ evaluate an integral for surface area about

(a) x-axis

(b) y-axis

$$y = x^4, \quad 0 \leq x \leq 1$$

(a) About x-axis

$$y' = 4x^3$$

$$ds = \sqrt{1 + (y')^2} dx$$

$$ds = \sqrt{1 + (4x^3)^2} dx$$

$$ds = \sqrt{1 + 16x^6} dx$$

$$A = \int 2\pi y ds$$

$$= \int_0^1 2\pi x^4 \sqrt{1 + 16x^6} dx$$

(b) About y-axis

~~$x = y^{1/4}$~~ $x = y^{1/4}$

$$x' = \frac{1}{4} y^{-3/4}$$

$$0 \leq y \leq 1$$

$$A = \int 2\pi x ds$$

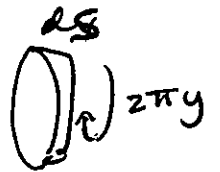
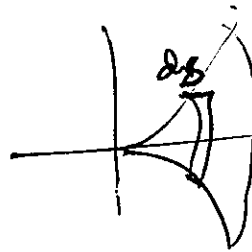
$$ds = \sqrt{1 + (x')^2} dy$$

$$A = \int 2\pi x ds$$

$$= \int_0^1 2\pi y^{1/4} \sqrt{1 + \left(\frac{1}{4} y^{-3/4}\right)^2} dy$$

$$A = \int_0^1 2\pi y^{1/4} \sqrt{1 + \frac{1}{16} y^{-3/2}} dy$$

or $A = \int 2\pi x ds = \int_0^1 2\pi x \sqrt{1 + 16x^6} dx$



$$A = \int 2\pi y ds$$

$$ds = \sqrt{1 + (y')^2} dx$$