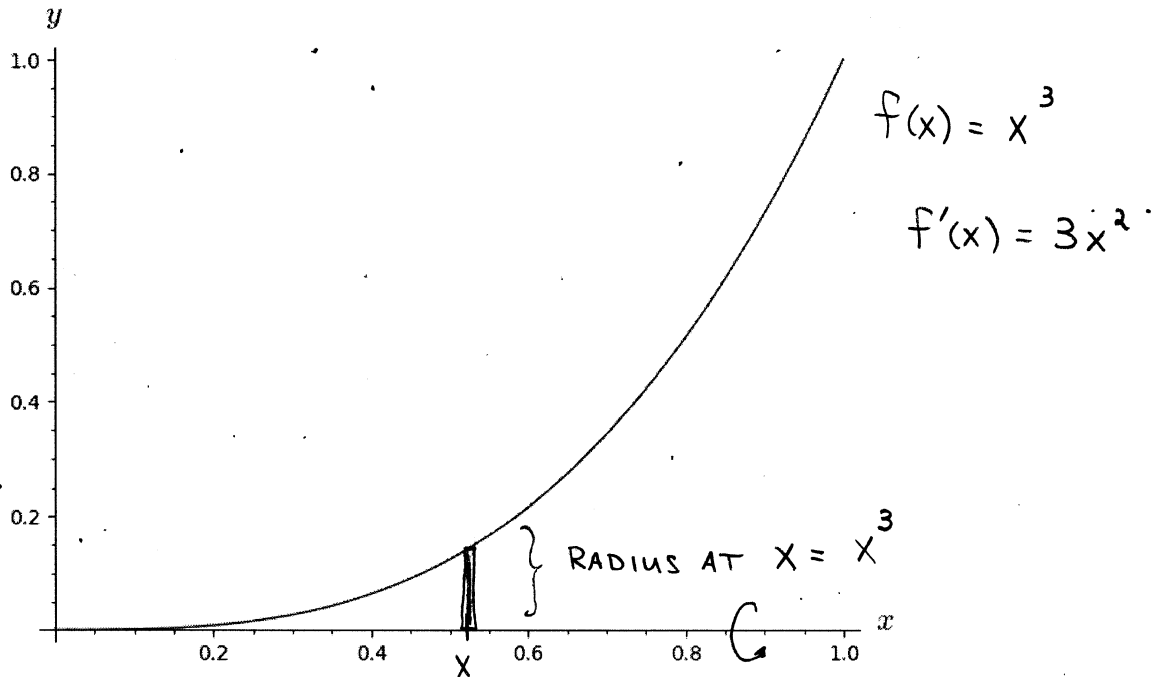


Example

The graph of $y = x^3$ from $x = 0$ to $x = 1$ is rotated about the x -axis. Find the surface area of the region that is generated. Use technology to evaluate your definite integral.

Solution



SURFACE AREA =

$$2\pi \int_0^1 x^3 \sqrt{1 + (3x^2)^2} dx$$

$$= 2\pi \int_0^1 x^3 \sqrt{1 + 9x^4} dx$$

↑ THIS CAN BE EVALUATE EXACTLY
BY USING $u = 1 + 9x^4$
SUBSTITUTION.

TECHNOLOGY GIVES

$$\text{SURFACE AREA} \approx 3.5631$$