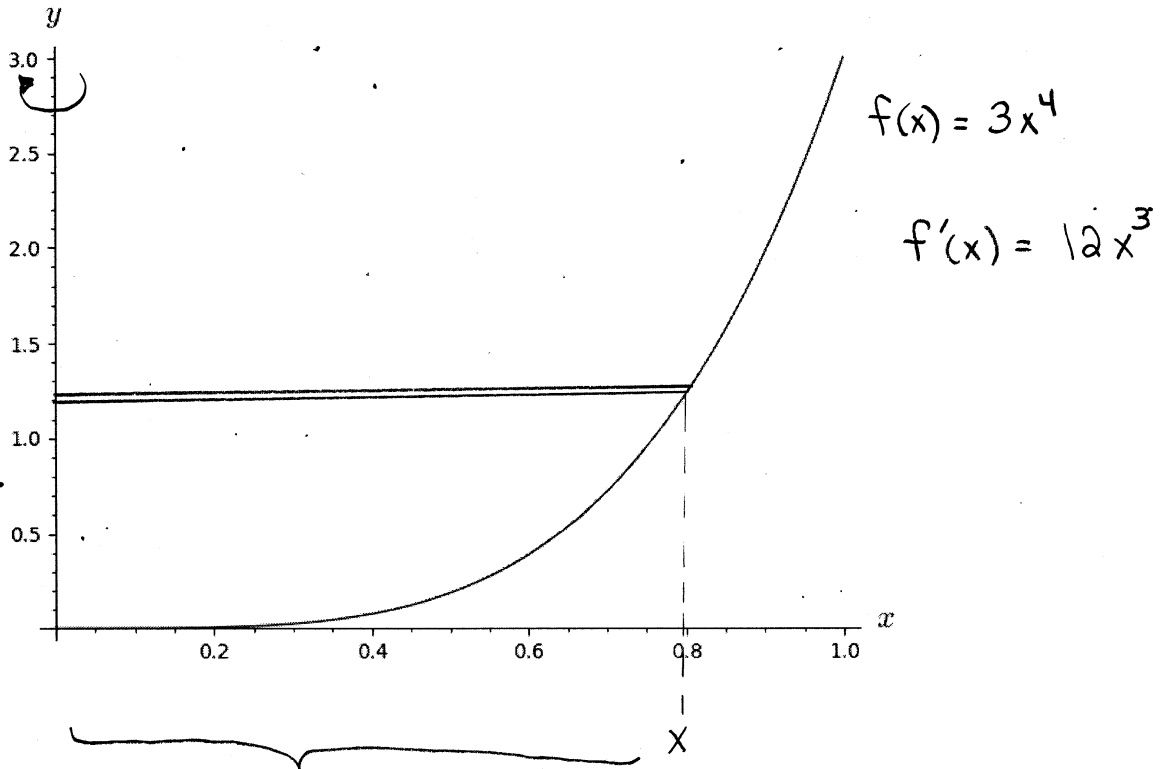# Example

The graph of $y = 3x^4$ from $x = 0$ to $x = 1$ is rotated about the y-axis. Find the surface area of the region that is generated. Use technology to evaluate your definite integral.

Solution

$f(x) = 3x^4$

$f'(x) = 12x^3$

THIS DISTANCE AT X IS SIMPLY X.

$$\text{SURFACE AREA} = 2\pi \int_0^1 x \sqrt{1 + (12x^3)^2} \, dx$$

$$= 2\pi \int_0^1 x \sqrt{1 + 144 x^6} \, dx$$

TECHNOLOGY

$$\approx 15.8264$$