

1. Find the arc length of the graph of the following equations from A to B .

(a) $y = \frac{1}{3}(x^2 + 2)^{\frac{3}{2}}$; $A(0, \frac{2}{3}\sqrt{2})$ $B(3, \frac{11}{3}\sqrt{11})$

(b) $x = \frac{y^3}{3} + \frac{1}{4y}$; $A(\frac{7}{12}, 1)$ $B(\frac{109}{12}, 3)$

(c) $y = \int_0^x \sqrt{\sec^4 t - 1} dt$; $A(-\frac{\pi}{4}, -0.54\dots)$ $B(\frac{\pi}{4}, 0.54\dots)$

-
2. The graph of the equation $y = x^3$ from $A(0, 0)$ to $B(2, 8)$ is revolved about the x -axis. Find the area of the resulting surface.
3. The graph of the equation $y = x^2$ from $A(0, 0)$ to $B(\sqrt{2}, 2)$ is revolved about the y -axis. Find the area of the resulting surface.
4. Set up the integral that will solve the following problem: A manufacturer needs to make corrugated metal sheets 36 inches wide with cross sections in the shape of the curve $y = \frac{1}{2} \sin \pi x$, $0 \leq x \leq 36$. How wide must the original flat sheets be for the manufacturer to produce these corrugated sheets? [You **do not** need to evaluate this integral]

5. Derive a formula for the surface area of a sphere of radius r .