

A.P Calculus Worksheet: Areas of Surfaces of Revolution

Find the areas of the surfaces generated by revolving the curves in problems 1-4 about the axes indicated:

1. $y = x/2$, $0 \leq x \leq 4$, about the x -axis. Check your result with a formula from geometry.

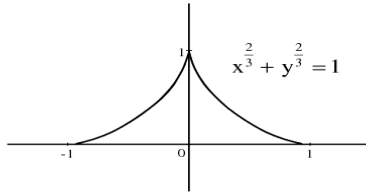
2. $y = \frac{x^3}{9}$, $0 \leq x \leq 2$, about the x -axis.

3. $y = \sqrt{2x - x^2}$, $0 \leq x \leq 2$, about the x -axis.

4. $x = \frac{y^3}{3}$, $0 \leq y \leq 1$, about the y -axis.

5. The surface of a sphere. Use an integral to find the surface area of the sphere generated by revolving the semicircle $y = \sqrt{1 - x^2}$, $-1 \leq x \leq 1$, about the x -axis. Check your result with a formula from geometry.

6. The surface of an astroid. Find the area of the surface generated by revolving the portion of the astroid $x^{2/3} + y^{2/3} = 1$ shown below about the x -axis. (Hint: Revolve the first quadrant portion $y = (1 - x^{2/3})^{3/2}$, $0 \leq x \leq 1$, about the x -axis, and double your result.)



Answers:

1. $4\sqrt{5}\pi$ 2. $\frac{98\pi}{81}$ 3. 4π 4. $\frac{\pi(2\sqrt{2}-1)}{9}$ 5. 4π 6. $\frac{12\pi}{5}$