

Instructions: Show all work. Answers without work required to obtain the solution will not receive full credit. Some questions may contain multiple parts: be sure to answer all of them. Give exact answers unless specifically asked to estimate.

1. Find the volume of the solid of revolution described by $y = \cos x$, $y = 0$, $[-\frac{\pi}{2}, \frac{\pi}{2}]$ revolved around the x -axis. [Hint: use cylindrical disk method.]



$$\int_{-\pi/2}^{\pi/2} \pi r^2 dx = \int_{-\pi/2}^{\pi/2} \pi \cos^2 x dx =$$

even

$$\frac{2\pi}{2} \int_0^{\pi/2} 1 + \cos 2x dx = \pi \left[x - \frac{1}{2} \sin 2x \right]_0^{\pi/2}$$

$$\pi \left[\frac{\pi}{2} - 0 \right] = \frac{\pi^2}{2}$$

2. Find the volume of the solid of revolution described by $y = \sqrt[3]{x}$, $y = 0$, $x = 1$ revolved around the y -axis. [Hint: use cylindrical shells.]



$$\int_0^1 2\pi \cdot \sqrt[3]{x} \cdot x dx =$$

$$2\pi \int_0^1 x^{4/3} dx = 2\pi \cdot \frac{3}{7} x^{7/3} \Big|_0^1 = \boxed{\frac{6\pi}{7}}$$