PRINT Your Name:_____

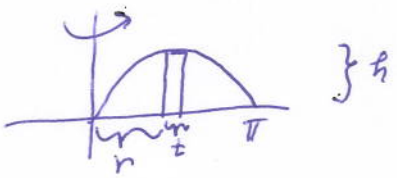
Quiz 6 — September 25, 2009 – 9:05 section

Remove everything from your desk except this page and a pencil or pen.

Circle your answer. **Show your work.**
The quiz is worth 5 points.

Find the volume of the solid generated when the region between $y = \sin x$ and $y = 0$ for $0 \leq x \leq \pi$ is revolved about the y-axis.

Answer:



Spin the rectangle. Get a cylindrical shell of volume $2\pi rht$, where $t = dx$, $r = x$, and $h = \sin x$. The volume of the solid is

$$2\pi \int_0^\pi x \sin x dx.$$

We apply integration by parts: $\int udv = uv - \int vdu$. Let $u = x$ and $dv = \sin x dx$. It follows that $du = dx$ and $v = -\cos x$. Thus the volume is

$$= 2\pi \left[-x\cos x + \int \cos x dx \right]_0^\pi = 2\pi \left[-x\cos x + \sin x \right]_0^\pi = \boxed{2\pi(\pi)}.$$