

Full name(s): _____ .

Questions

1. Use the shell method to find the volume of the solid that results from rotating around the y -axis the region between $f(x) = \sin(x)$ and $g(x) = x$ from $x = 0$ to $\frac{\pi}{2}$.
2. Compute the same volume using the disk/washer method.
3. Use the disk method to compute the volume of the region obtained by rotating about the x -axis the curve $p(x) = x(x - 1)$ around the x axis from $x = 0$ to $x = 1$.
4. Compute the same volume using the shell method.
5. Convert the point $(x, y) = (1, 2)$ to polar coordinates (r, θ) .
6. Convert the point $(r, \theta) = (5, -\frac{\pi}{4})$ to cartesian coordinates (x, y) .
7. Graph (approximately) each of the following polar curves:
 1. $r(\theta) = \frac{1}{2}\theta$
 2. $r(\theta) = \ln(e + \theta/2\pi)$
 3. $r(\theta) = \cos(\theta)$
 4. $r(\theta) = 1 + \sin(\theta)$

Compute each of the following:

1. The arc length of the spiral $(\theta) = \theta$ from $\theta = 0$ to $\theta = 2\pi$.
2. The area of the first petal of $r(\theta) = 3\sin(2\theta)$.
3. The spiraling area between $r(\theta) = \theta + 1$ from $\theta = 0$ to $\theta = 2\pi$.