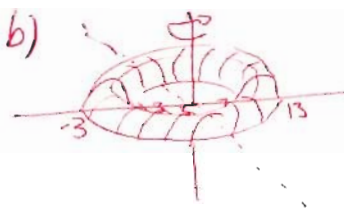
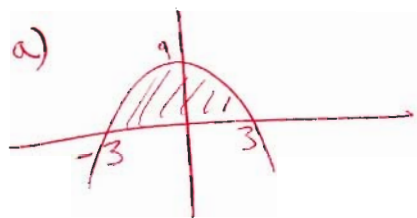


Quiz 3/22/06 Volume of Solids of Revolution

Name _____

Find the volume of the solid of revolution formed by rotating the region bounded by the curve $y = 9 - x^2$ and the x -axis about the line $x = 5$.

- (2) Sketch the region bounded by the curve $y = 9 - x^2$ and the x -axis.
- (2) Sketch the solid of revolution.
- (5) Set the volume integral up using cylindrical shells.
- (1) Evaluate the integral.
- (5) Set the volume integral up using the method of washers.



c)

$$2\pi \int r h dx$$

$$2\pi \int_{-3}^3 (5-x)(9-x^2) dx$$

d)

$$2\pi \int_{-3}^3 (45 - 9x - 5x^2 + x^3) dx$$

$$= 2\pi \left[45x - \frac{9x^2}{2} - \frac{5x^3}{3} + \frac{x^4}{4} \right]_{-3}^3$$

$$= 2\pi [270 - 90] = 360\pi$$

e)

$$y = 9 - x^2 \quad \pi \int [R^2 - r^2] dy$$

$$x^2 = 9 - y$$

$$x = \pm \sqrt{9 - y}$$

radius is $5 - x = \begin{cases} 5 + \sqrt{9 - y} & \text{outer radius} \\ 5 - \sqrt{9 - y} & \text{inner radius} \end{cases}$

$$V = \pi \int_0^9 [(5 + \sqrt{9 - y})^2 - (5 - \sqrt{9 - y})^2] dy$$

$$V = \pi \int_0^9 [25 + 10\sqrt{9 - y} + 9 - (25 - 10\sqrt{9 - y} + 9)] dy$$

$$= \pi \int_0^9 20\sqrt{9 - y} dy$$

$$= \pi \left[20(9 - y)^{3/2} \left(\frac{2}{3}\right)(-1) \right]_0^9$$

$$= 360\pi \checkmark$$