

6.3 examples

Friday, March 29, 2019 12:32 PM

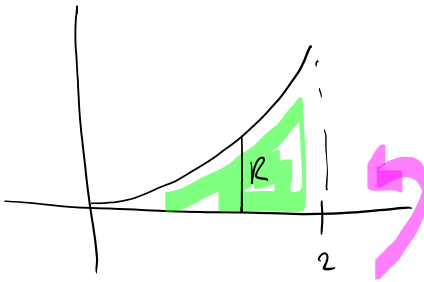


6.3 examples

Calculus AB: Volumes of Revolution (section 6.3)

Example 1

Calculate the volume V of the solid obtained by rotating the region under $y = x^2$ about the x -axis for $0 \leq x \leq 2$.



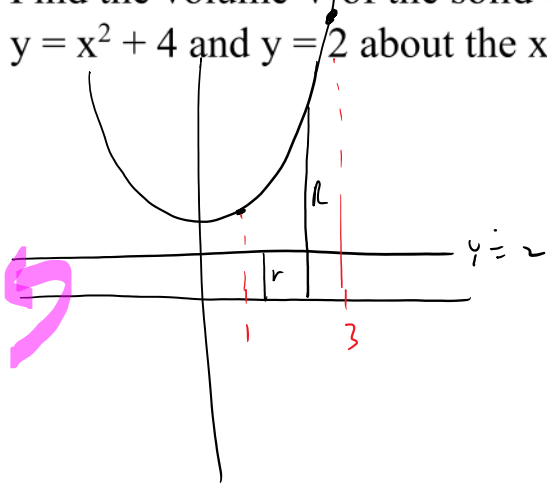
$$\pi \int_0^2 f(x)^2 dx = \pi \int_0^2 (x^2)^2 dx$$

~ 0.1 or

$$\frac{32\pi}{5}$$

Example 2 – Rotating the Area Between Two Curves

Find the volume V of the solid obtained by rotating the region between $y = x^2 + 4$ and $y = 2$ about the x-axis for $1 \leq x \leq 3$.



$$R = x^2 + 4$$

$$r = 2$$

$$\pi \int_1^3 (x^2 + 4)^2 - 2^2 dx$$

$$= 141.733 \pi$$

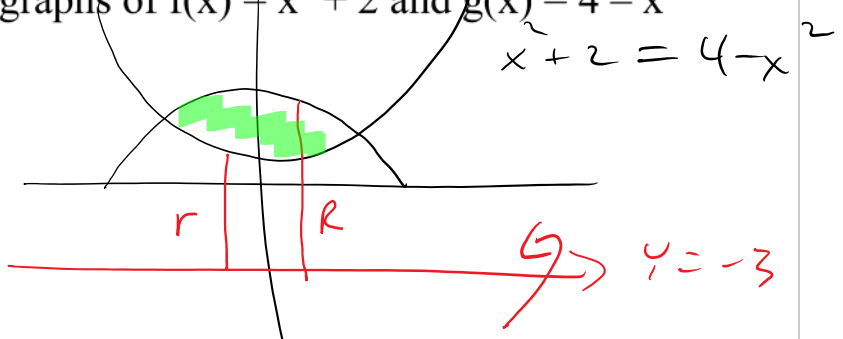
Example 3 – Revolving About a Horizontal Axis

Find the volume V of the “wedding band” in Figure 7(C), obtained by rotating the region between the graphs of $f(x) = x^2 + 2$ and $g(x) = 4 - x^2$ about the horizontal line $y = -3$.

$$R = 4 - x^2 + 3$$

$$r = 2 + x^2 + 3$$

$$\pi \int_{-1}^1 (7 - x^2)^2 - (5 + x^2)^2 dx$$



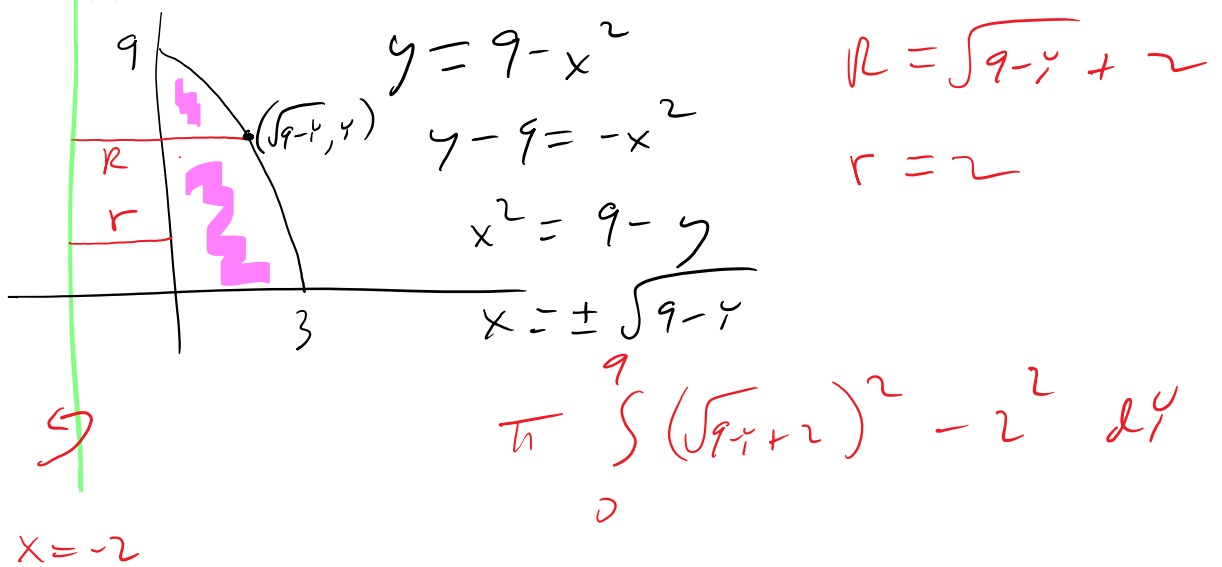
$$\frac{399}{23-25}$$

Example 4

Find the volume V of the solid obtained by rotating the region between the graph of $f(x) = 9 - x^2$ and the line $y = 12$ for $0 \leq x \leq 3$ about (a) the line $y = 12$ and (b) the line $y = 15$.

Example 5 – Revolving About a Vertical Axis

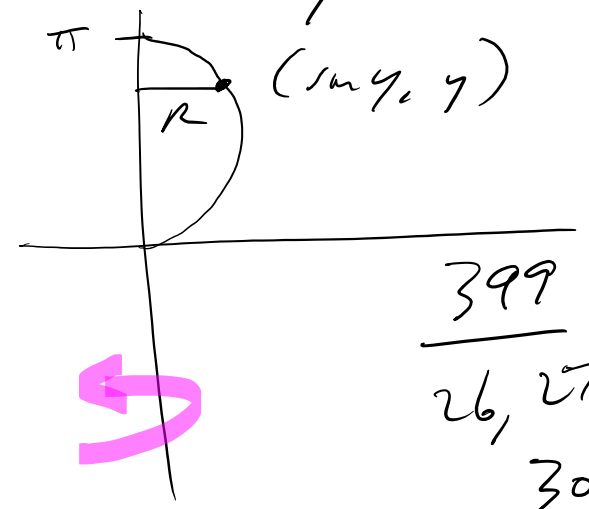
Find the volume of the solid obtained by revolving the region under the graph of $f(x) = 9 - x^2$ for $0 \leq x \leq 3$ about the vertical axis $x = -2$.



$y = \sin^{-1} x$ $x=0$ $0 \leq y \leq \pi$

revolve around y -axis

$x = \sin y$



$\pi \int_0^{\pi} \sin^2 y \, dy$

399

26, 27, 28
30, 31