Good afternoon: warm up in notebooks

Find the area between f(x)=sin(x) and g(x)=cos(x) over [-3π/4, 5π/4] without a calculator

$$\int_{-3\pi/4}^{\pi/4} \cos(x)-\sin(x)\,dx$$

$$\sin(x)+\cos(x)\Big|_{-3\pi/4}^{\pi/4}$$

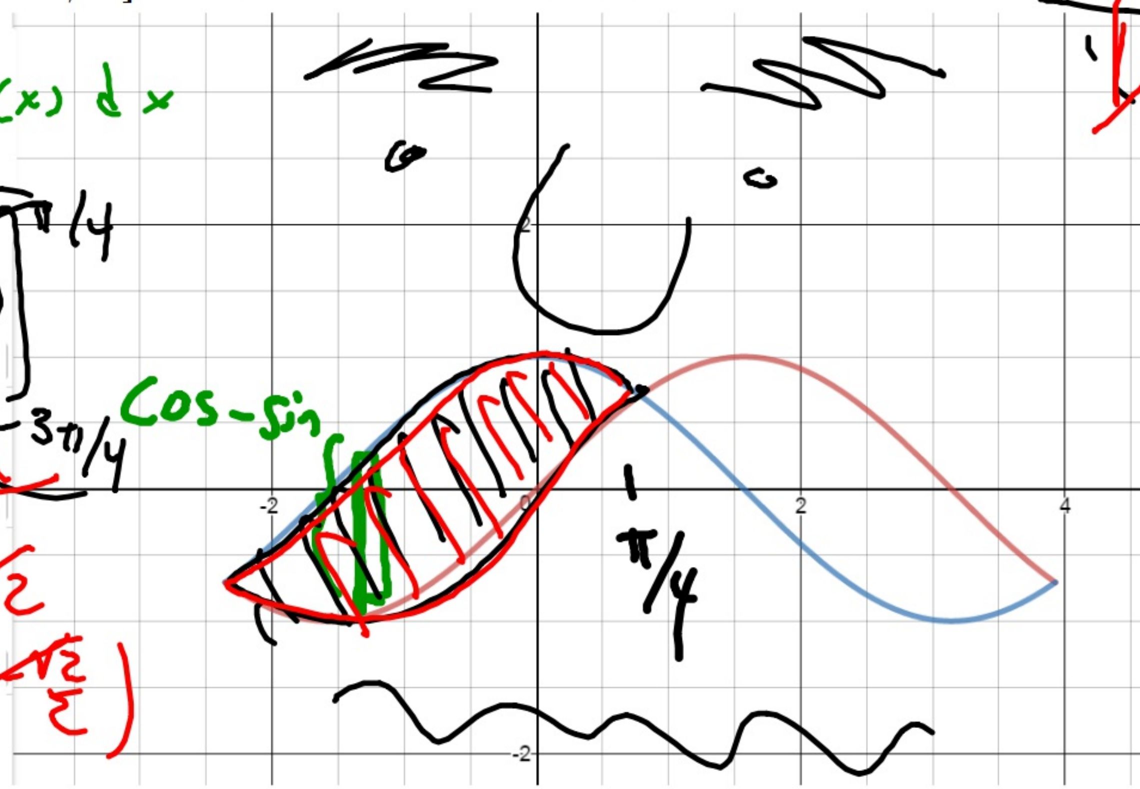
$$\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2}$$

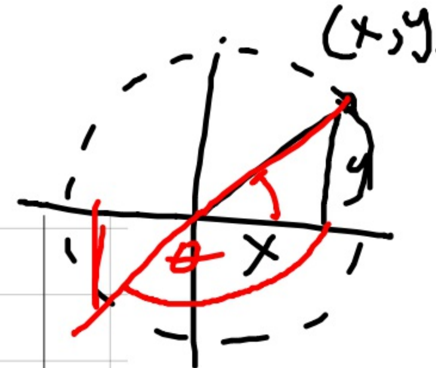
$$\frac{1}{2}\sqrt{2}+\frac{1}{2}\sqrt{2}$$

$$\sqrt{2}-\left(\cancel{\frac{-\sqrt{2}}{2}}-\frac{\sqrt{2}}{2}\right)$$

$$-\sqrt{2}$$

$$2\sqrt{2}$$





tutoring today

assessment Mon 3/13

Let's do #11, 12, and 26!!

26.) $\frac{d}{dx}\left[3y^2 - 2x^2\right] = \left[6 - 2xy\right]\frac{d}{dx}$ $(3, 2)$

$6y \cdot y' - 4x = 0 - (2y + 2x \cdot y')$

$6yy' - 4x = -2y - 2xy'$

$6yy' + 2xy' = -2y + 4x$

$y'(6y + 2x) = 4x - 2y$

$y' = \frac{4x - 2y}{6y + 2x}$ $\frac{4(3) - 2(2)}{6(2) + 2(3)} = 8/18 \to 4/9$

$$\begin{cases} f(g(x)) = x \\ f'(g(x)) \cdot g'(x) = 1 \end{cases}$$

$$g'(x) = \frac{1}{f'(g(x))}$$

$$g(2) = \frac{1}{f'(g(2))} \rightarrow \frac{1}{f'(1)}$$

Work on it for the remainder of class plz

Already done? Let me know

11. $\displaystyle\int_{0}^{2} \sqrt{2x+1} \cdot \cancel{dx}$

x-vals

Let $u = 2x+1 \longrightarrow \dfrac{du}{dx} = 2$

$du = 2 \cdot dx$

$\dfrac{du}{2} = dx$

$$\int_{1}^{5} \sqrt{u}\,\frac{du}{2}$$

$$\frac{1}{2}\int_{1}^{5} \sqrt{u} \cdot du \quad C$$

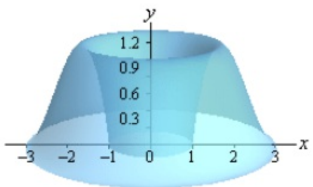
Good afternoon:

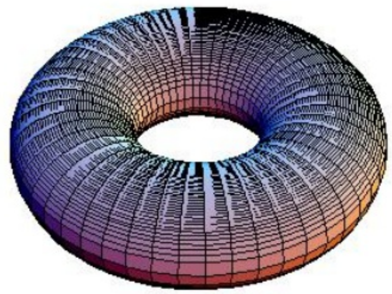
Take some time to work on/check/compare the 2003 AP MC NC test passed out Monday

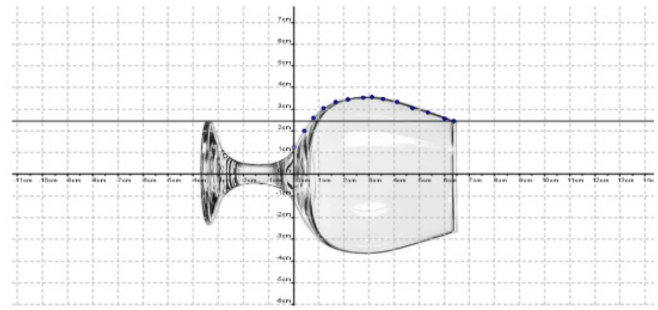
I will reveal the answers in a bit for you to check

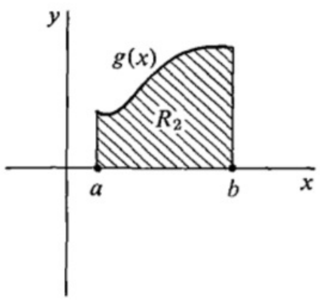
colored pencils will be very useful today!!!!!!!!

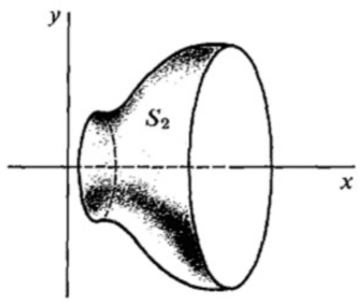
Volume of Revolution

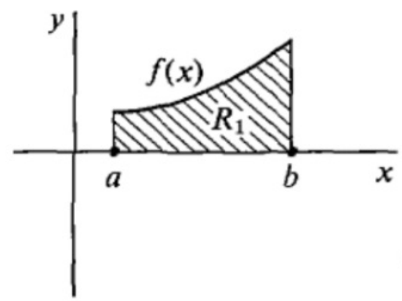


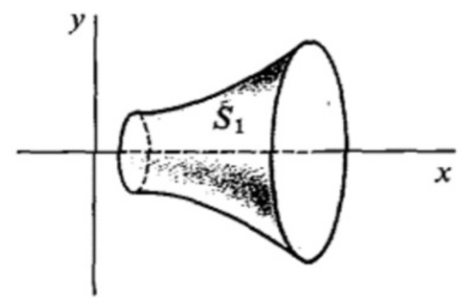


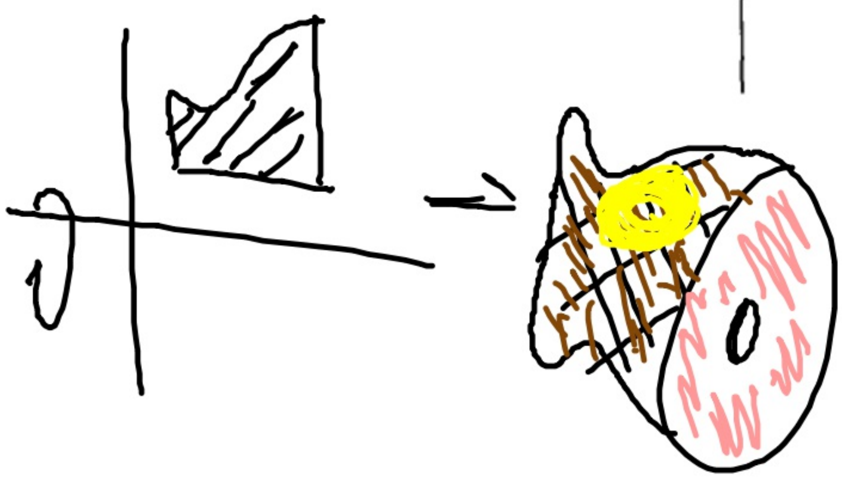




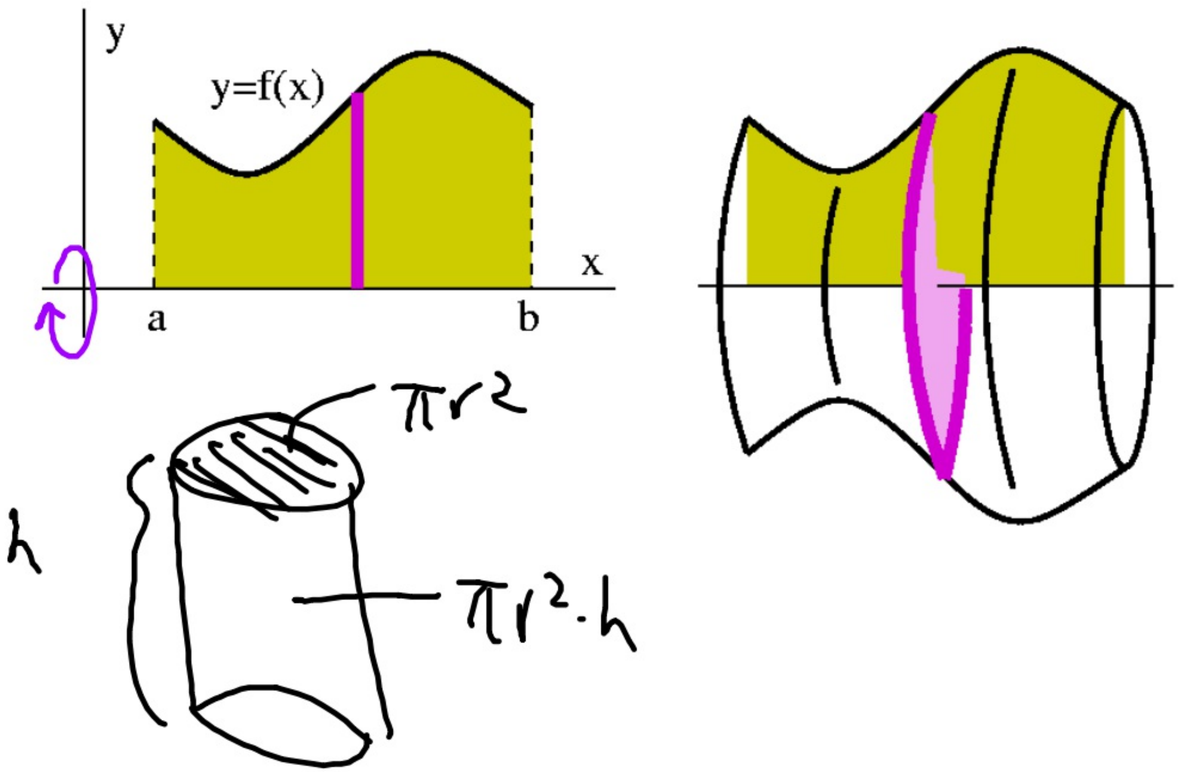




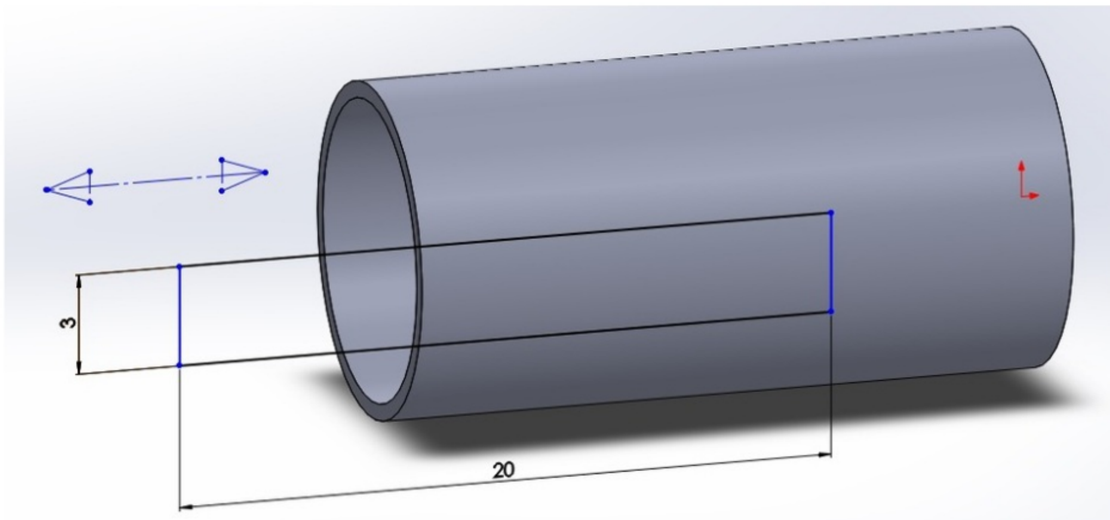




Volume of Solids of Revolution (disk method and washer method)



What happens when you revolve a rectangle around an axis?

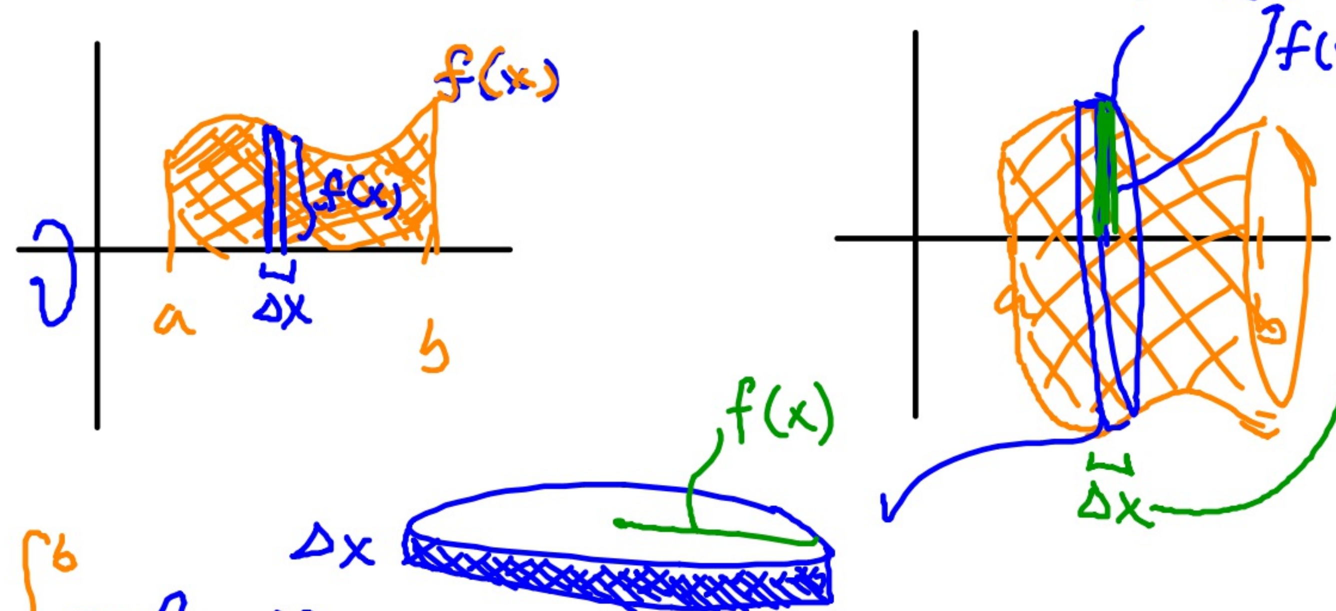


3
20

So a single rectangle becomes a cylindrical "disk"

What is its radius? What is its height/depth?

$V = \pi \cdot r^2 \cdot h$



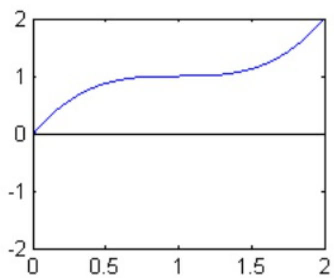
Δx

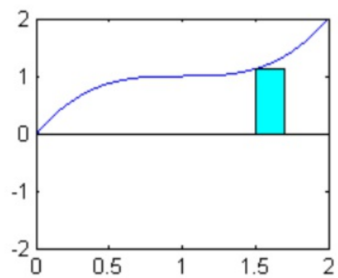
Substitution

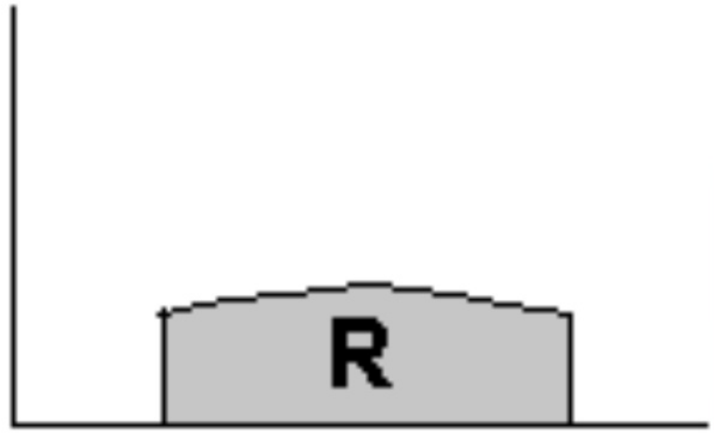
$V = \pi (f(x))^2 \cdot \Delta x$

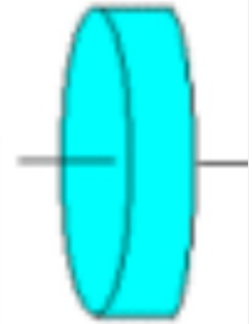
$$\underbrace{V = \int_a^b \pi \cdot (f(x))^2 dx}_{\text{Volume by disks.}}$$


Pillsbury
Chocolate Chip COOKIES

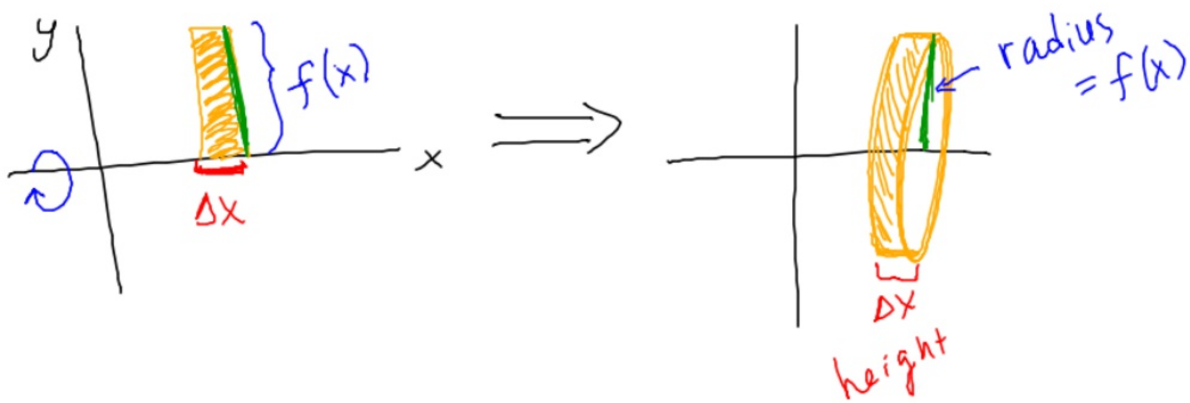

2
1
0
-1
-2
0
0.5
1
1.5
2


2
1
0
-1
-2
0
0.5
1
1.5
2


R



Volume of solid = sum of volume of slices



Concrete Example: Region bounded $y = x^2$, x-axis, and $x=2$ revolved around the x-axis.

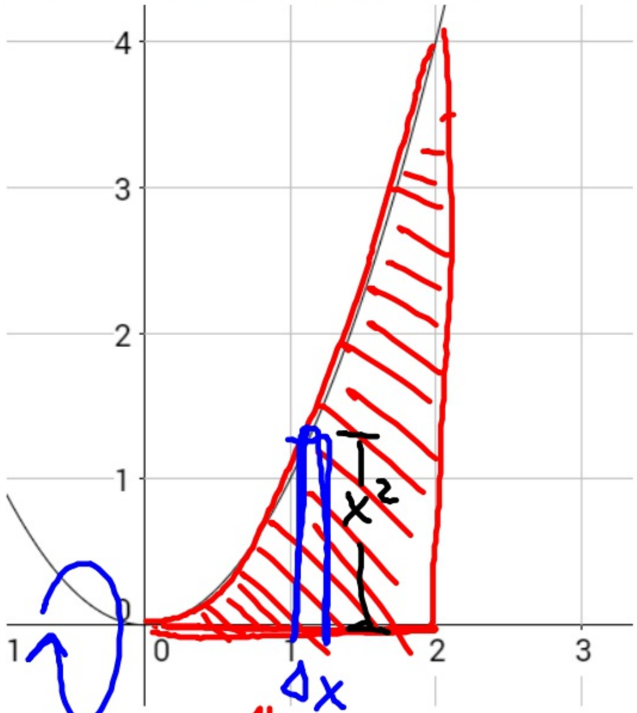
$$V = \int_0^2 \pi (x^2)^2 \cdot dx$$

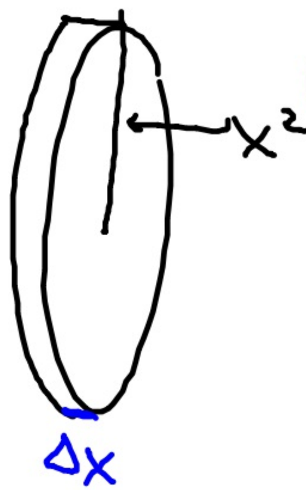
$$\int 3 \cdot x^2 \cdot dx$$

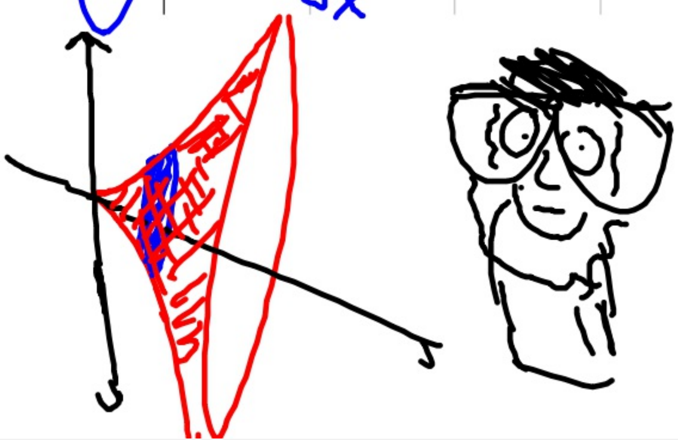
$$3 \int x^2 \cdot dx$$

$$\underbrace{\pi \int_0^2 x^4 \cdot dx}$$

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



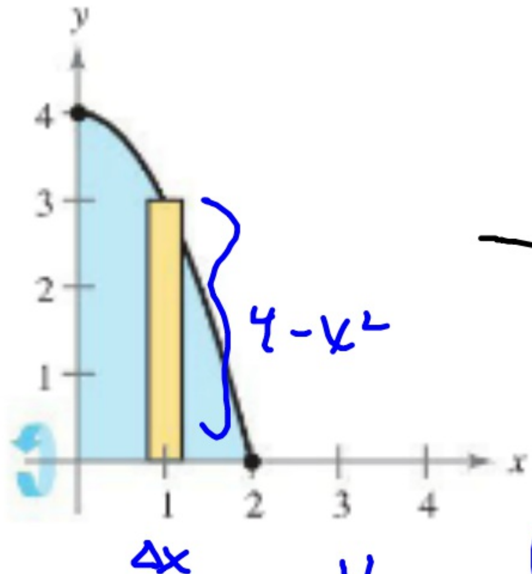


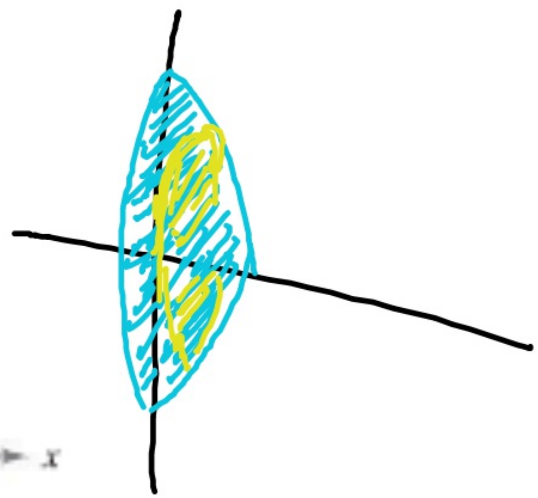


Always sketch:

- revolution axis
- single rectangle
- single disk

2. $y = 4 - x^2$





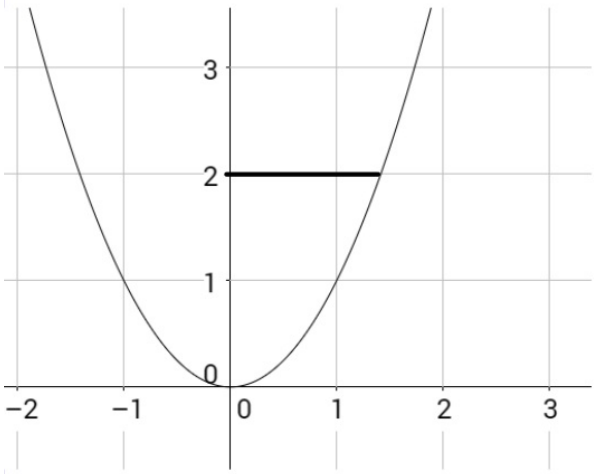
$$V = \pi \int_0^2 (4 - x^2)^2 \cdot dx$$

$$V = \pi \boxed{\frac{256}{15}}$$

Axes of Revolution: x-axis

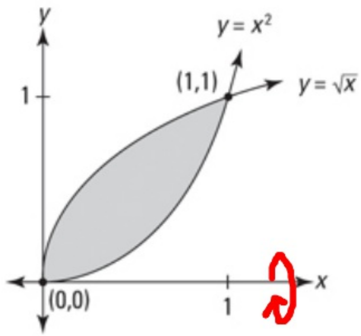
y-axis

other vertical + horizontal lines

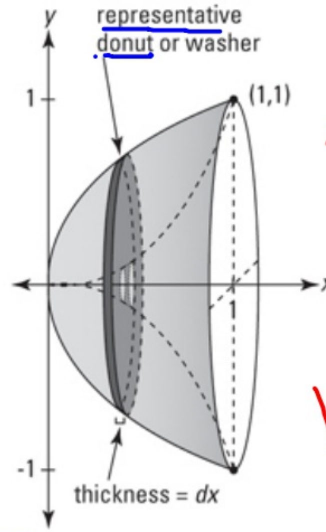


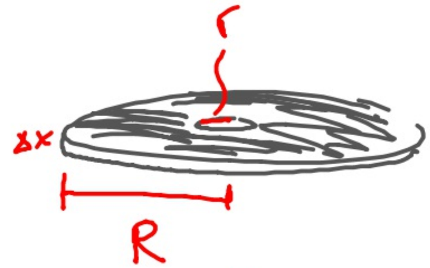
Revolve about the y-axis

What about this?



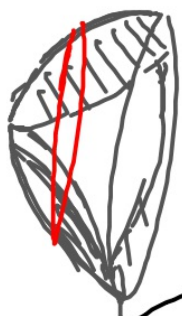
now revolve this shaded area about the x-axis





$$V = \pi R^2 \cdot \Delta x - \pi r^2 \cdot \Delta x$$

$$V = (\pi R^2 - \pi r^2)\Delta x$$

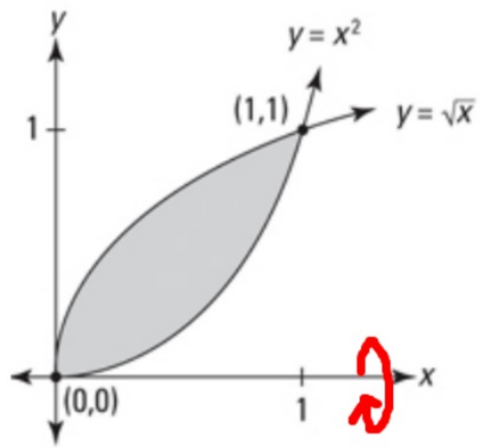


$$V = \int_a^b (\pi R^2 - \pi r^2)\,dx$$

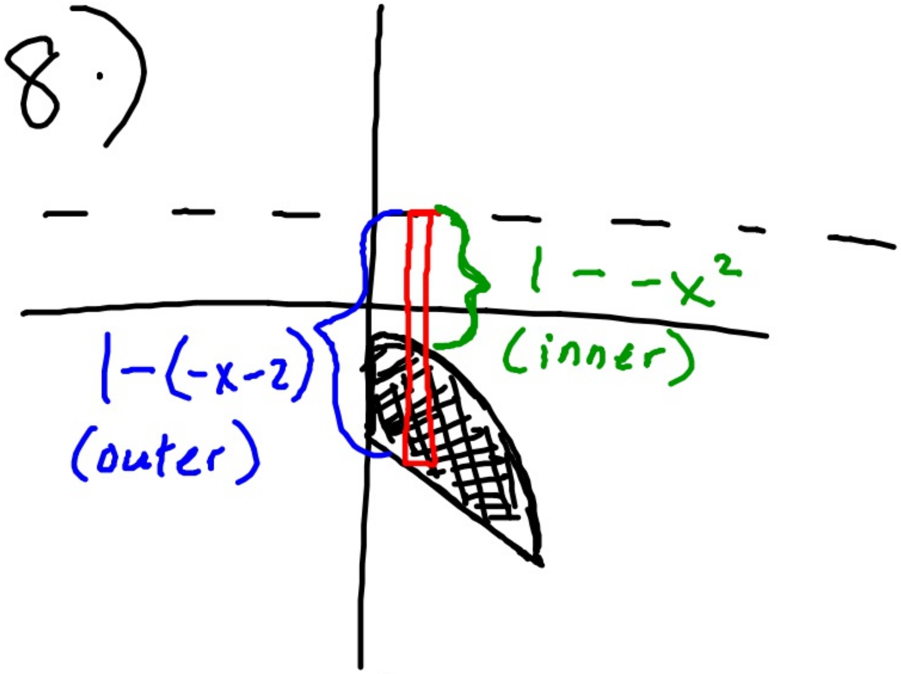
$$V = \pi \int_a^b (\underbrace{R^2}_{\text{outer radius}} - \underbrace{r^2}_{\text{inner radius}})\,dx$$

WASHER METHOD (annulus)

★ outer and inner are relative to the axis of rev. ★


y
$y = x^2$
(1,1)
$y = \sqrt{x}$
1
(0,0)
1
x

8.)



① draw rectangle adjacent to axis of rev.

② Mark the lengths of the rectangle. (top− bottom)

$$V = \pi \int_0^2 (3+x)^2 - (1+x^2)^2 \cdot dx$$

#1, 2, 5, 6, 7