Good afternoon:

Review presentation project info is being passed out

- assigned groups of 3
- 20-30 minutes to summarize concept, work thru examples, provide take-home handout with practice problems and answer key

Groups:

Alyssa, Jillian, Madison

Amador, Hunter, Liam

Brennan, Gaven, Hannah

Brooke, Julian, Zoe

Caleb, Maia, Justin

Topics:

Limits and Continuity

Taking Derivatives

Applying Derivatives

Finding antiderivatives

Definite integrals and FTC

Q4 day by day

Wed Mar 29 - Volumes by cross section
Fri Mar 31 - Reviewing Volume, starting Diff Eq

Mon Apr 3 - 😭
Wed Apr 5 - Assess on volume, Slope fields, Separable diff eq
Fri Apr 7 - More on diff eq

Mon Apr 10 - Assess on diff eq
Wed Apr 12 - Motion, revisited
<u>**Saturday timed test??**</u>
Mon Apr 17 (B) - review presentations
Wed Apr 19 - 55 minute timed AP test??
Fri Apr 21 - review presentations

Mon Apr 24 - AP test/Proj
Wed Apr 26 - AP test/Proj
Fri Apr 28 - AP test/Proj Due

Use remainder of time to plan out presentations, who does what, when/where/how to meet and collaborate

Then work on packet due Tuesday 4/4

Good afternoon: warm up is #316 on packet due Tuesday

$$\lim_{x \to 0} \frac{x^3 - 8}{x^2 - 4} = \frac{-8}{-4} = 2 \quad E$$

$$\lim_{x \to 2} \frac{x^3 - 8}{x^2 - 4}$$

$$\lim_{x \to 2} \frac{\cancel{(x-2)}(x^2+2x+4)}{\cancel{(x-2)}(x+2)}$$

$x+2$

4

$$\frac{16}{4}$$

4

Factoring a Sum of Cubes:

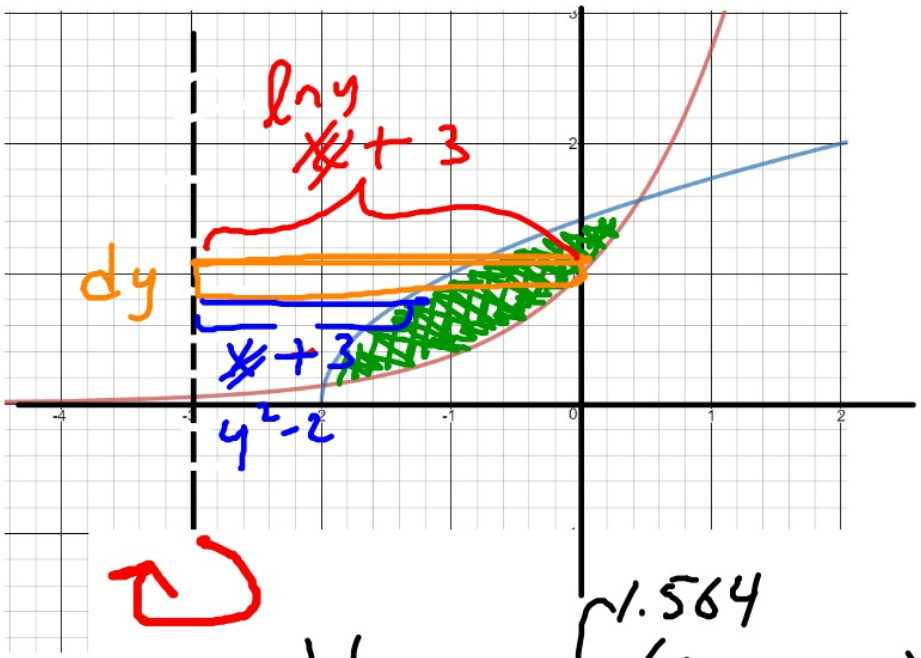
$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

Factoring a Difference of Cubes:

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

Volume by washer, vertical axes of rev (I messed up last time)



y=e^x $\Leftrightarrow$ $x = \ln y$

y=sqrt(x+2)

$x = y^2 - 2$

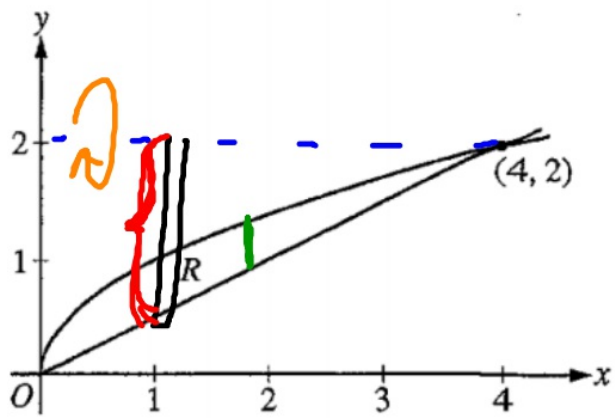
about x=-3

(-1.961 , 0.138)

(0.448 , 1.564)

$$V = \pi \int_{\cdot} (R)^2 - (r)^2 \, dy$$

$$V = \pi \int_{.138}^{1.564} (\ln y + 3)^2 - (y^2 - 2 + 3)^2 \, dy$$



y=sqrt(x)

y=x/2

$$\int_0^4 \sqrt{x} - \frac{x}{2}\,dx$$

$$\int_0^4 x^{1/2} - \frac{1}{2}x\,dx$$

$$\frac{2}{3}x^{3/2} - \frac{1}{4}x^2 \Big]_0^4$$

$$\frac{2}{3}\boxed{(4)^{3/2}} - \frac{1}{4}(\cancel{4})^{\cancel{2}\,16} - 0$$

$$\frac{2}{3}(\cancel{4^{1/2}})^{\cancel{3}\,8} - 4$$

$$\frac{16}{3} - \frac{12}{3}$$

$$4/3$$

1

Find area of R (no calc)

2

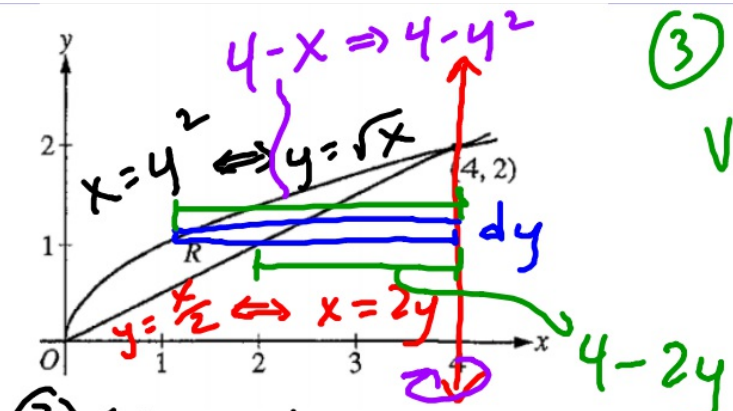
Revolve R around y=2 (calc)

Revolve R around x=4 (no calc)

2

$$V = \pi \int_0^4 \left(2 - \frac{x}{2}\right)^2 - \left(2 - \sqrt{x}\right)^2 dx$$

$$\boxed{2.667\pi}$$



③ rev. about
$x=4$

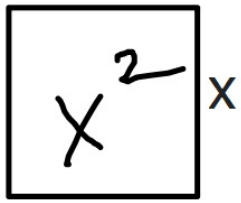
③

$$V = \pi \int_0^2 (4-y^2)^2 - (4-2y)^2 \, dy$$

$$\pi \left[6.4 \quad \right]$$

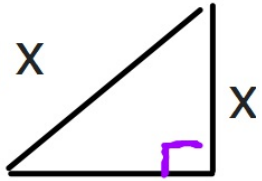
Review from Geometry (NOTES)

Find the area of a square with side x



Find the area of an isosceles right triangle with leg x

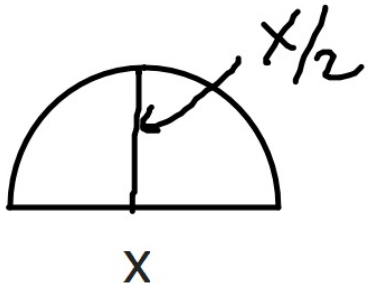
$\frac{1}{2}x^2$



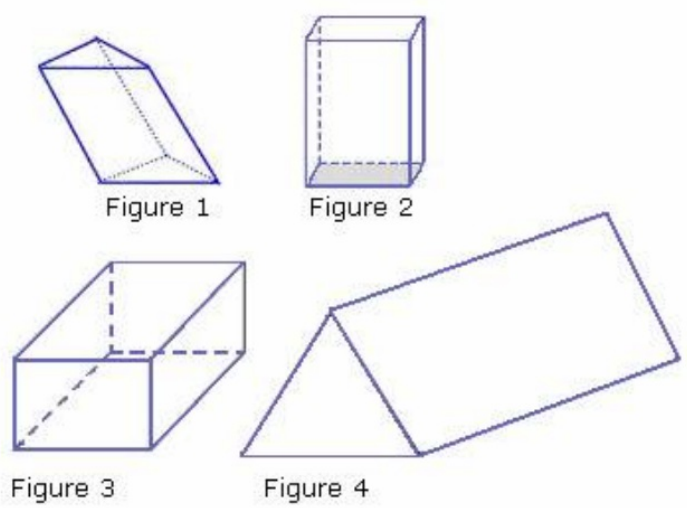
Find the area of a semicircle with diameter x

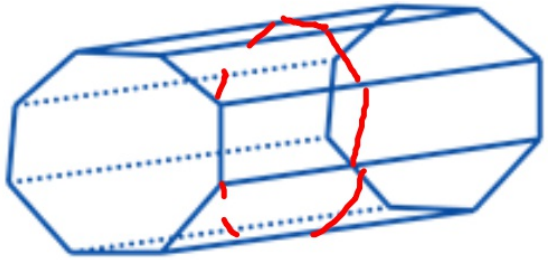
$$\frac{1}{2}\pi\left(\frac{x}{2}\right)^2$$

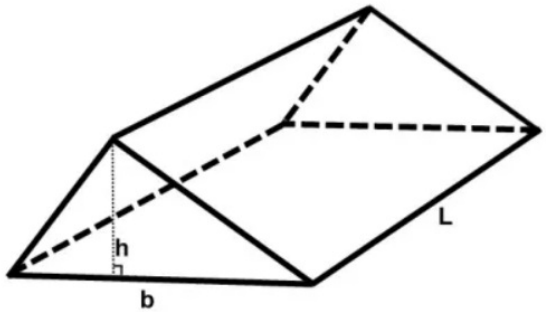
$$\frac{1}{2}\pi \cdot \frac{x^2}{4} \rightarrow \pi\frac{x^2}{8}$$

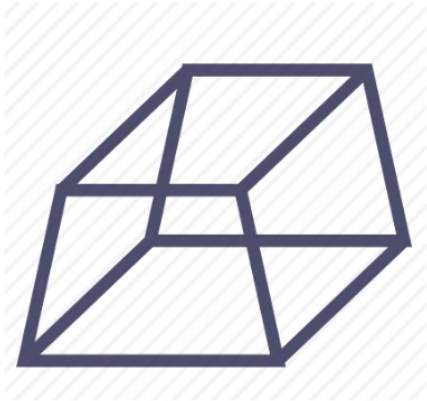


How do you find the volume of a Prism



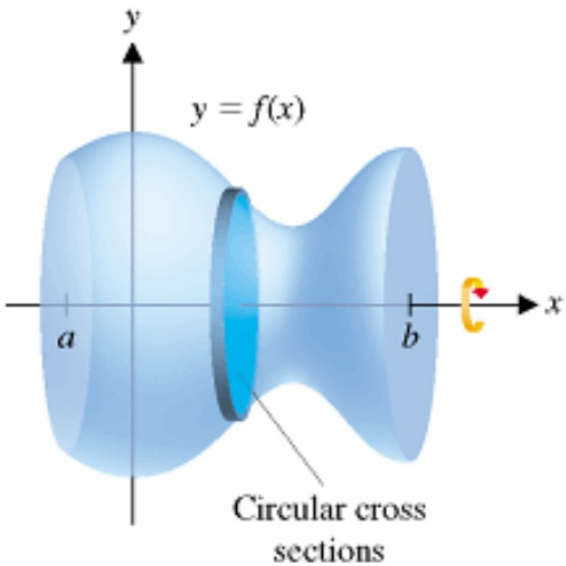






$V = (\text{Base Area})\,h$

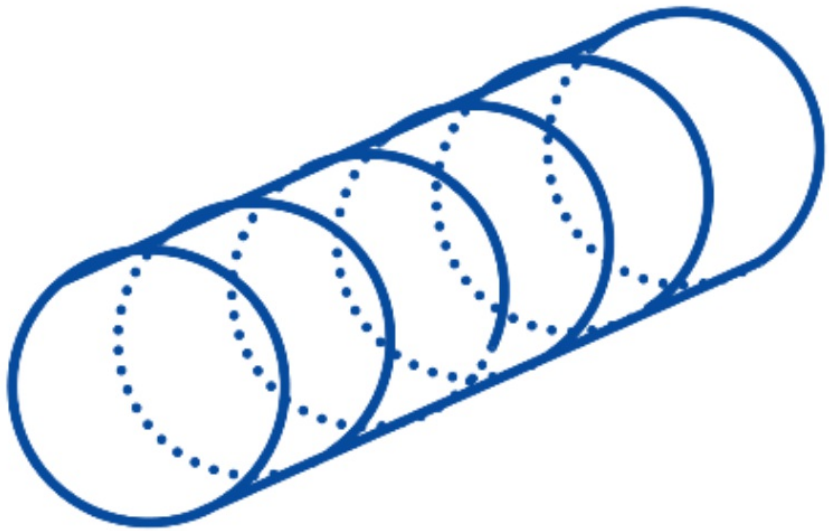
The basic premise of integrating to find volume:
Sum of disk volumes
Sum of disk area * dx (depth)



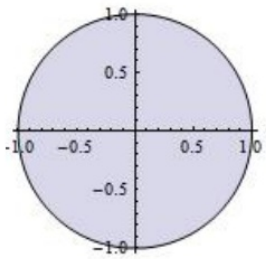
Basically just:

$$\int_a^b \pi (r)^2 \, dx$$

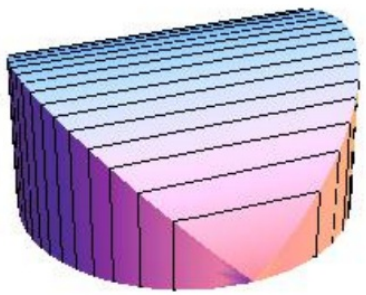
But isn't a disk (cylinder) just a circular prism

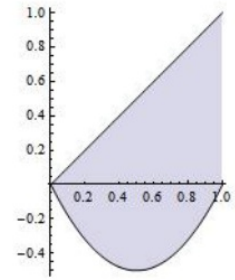


But what do shapes with non-cylindrical cross sections look like?

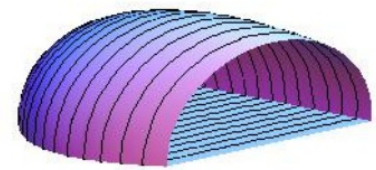


base region

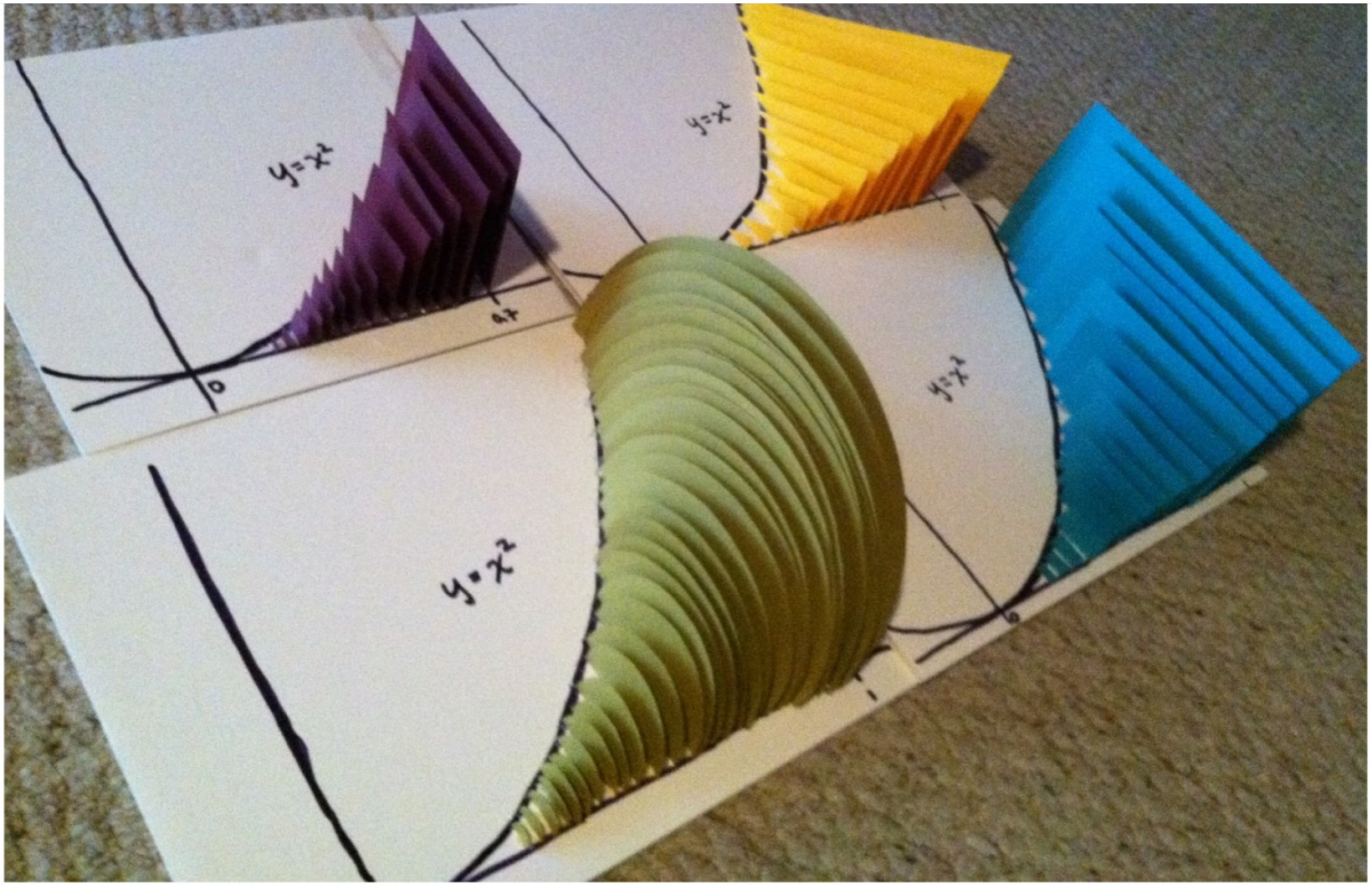




base region

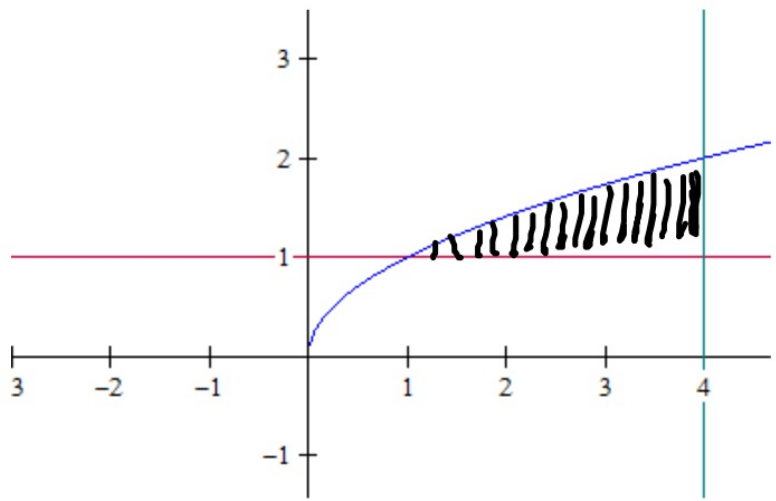


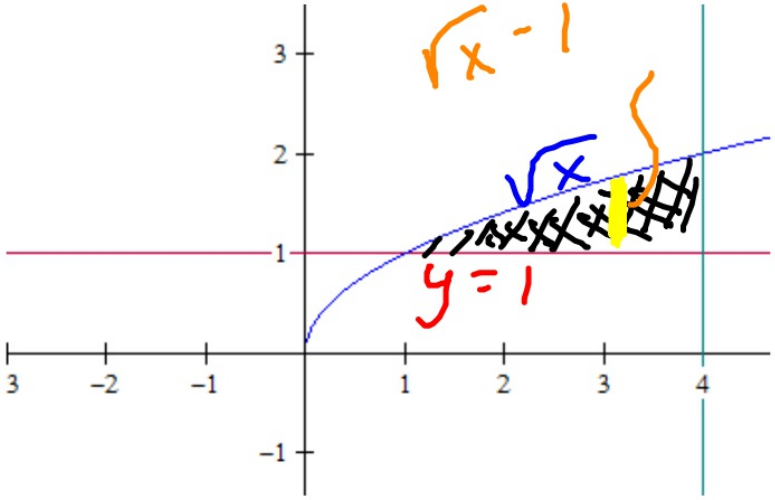
Two key things to remember: (1) no revolution/spinning involved
(2) the graph is flat BASE of the solid


y=x²
y=x²
y=x²
y=x²
0
0.4
1
0

My first volume by cross sections

The region R is bound by $y=\sqrt{x}$, y=1, and x=4.





A solid with R as its base is formed where cross sections perpendicular to the x-axis are squares. Find the volume of such a solid.

Area?

$$A(x) = (\sqrt{x}-1)^2$$

$$V = \int_1^4 (\sqrt{x}-1)^2\,dx$$

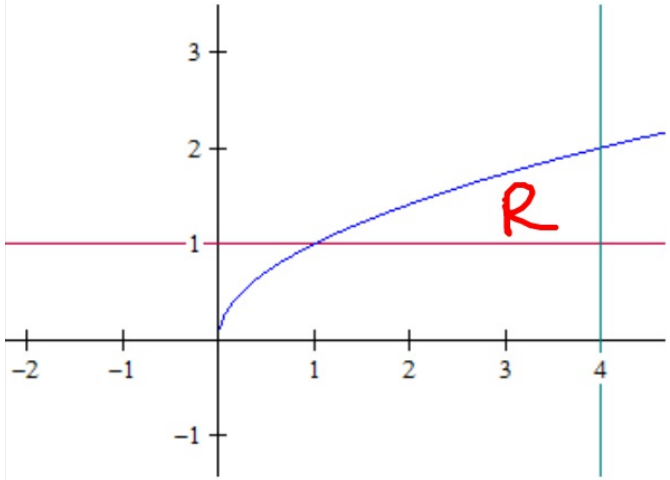
$$\approx \underline{\qquad\qquad}$$

Volume by Cross Section:

$$V = \int_a^b A(x)\,dx$$

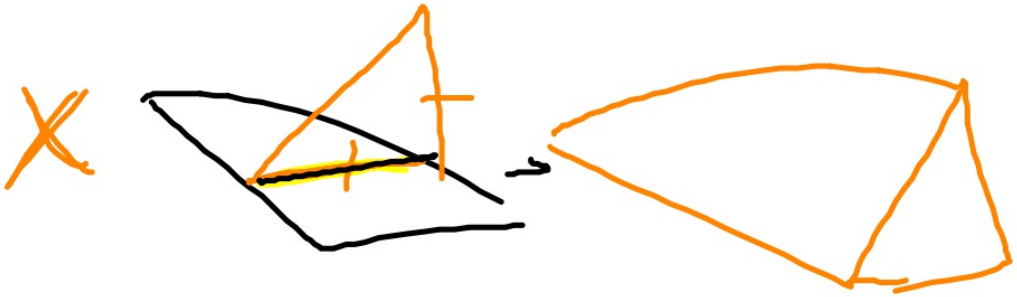
where $A(x)$ = the area of a single slice

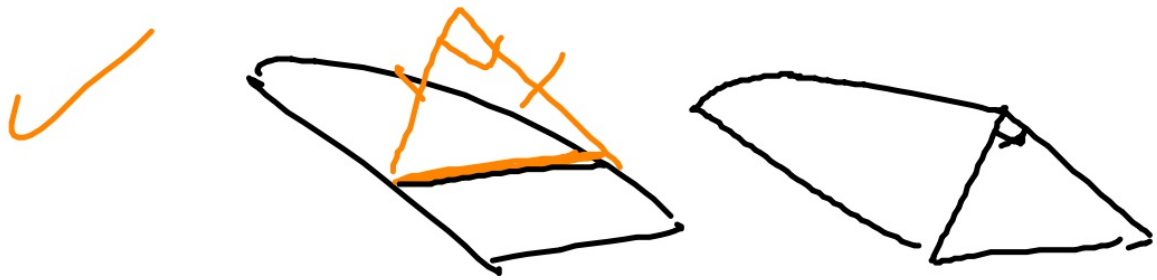
face



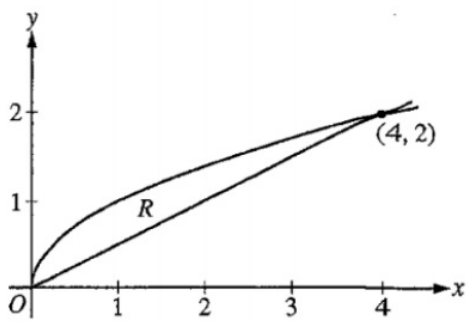
R is now the base of a solid whos cross sections perpendicular to the x-axis are ~~equilateral triangles~~. Fir the vol.

Rt △s with ~~a~~ hypotenuse in the plane of R.





Revisiting this:



Find volume of solid with base R and cross sections perpendicular to R are

- Squares
- Semicircles

Homework:

- keep working on packet due ~~Tuesday~~ Weds. 4/5
- volumes: p.456: 71a and 72cd
- presentations!