March 6

How is finding the volume by slicing different from finding the volume of revolution?

(How are they the same?)

$$\int (\text{area})\, dx$$

March 6

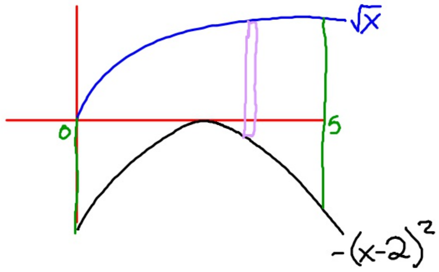
Students will verbally explain how to find the volume by slicing

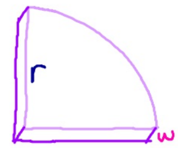
(using the words:

cross-section, area, dimensions, slice...)

The base of a solid lies between the curves
$y = \sqrt{x}$, $y = -(x-2)^2$,
$x = 0$ and $x = 5$
the cross-sections perpendicular to the x-axis are

quarter-circles





$w = dx$

$r = \sqrt{x} - \left(-(x-2)^2\right)$

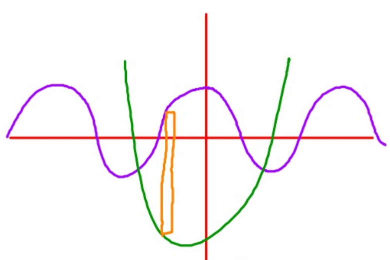
$r = \sqrt{x} + (x-2)^2$

$$A = \frac{\pi r^2}{4} = \frac{\pi\left(\sqrt{x} + (x-2)^2\right)^2}{4}$$

$$V = \int_0^5 \frac{\pi\left(\sqrt{x} + (x-2)^2\right)^2}{4}\, dx = 84.793$$

The base of a solid lies between the curves
$y = \cos x$ and
$y = x^2 - 4$
the cross-sections perpendicular to the x-axis are

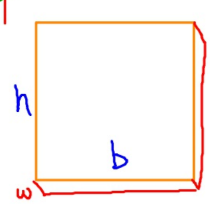
squares



bounds

$\cos x = x^2 - 4$

$x = 1.914, -1.914$



$w = dx$

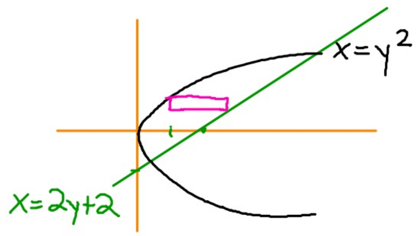
$h = \cos x - (x^2 - 4)$

$b = \cos x - (x^2 - 4)$

$$A = bh = b^2 = \left(\cos x - (x^2-4)\right)^2$$

$$V = \int_{-1.914}^{1.914} \left(\cos x - (x^2-4)\right)^2 dx = 49.677$$

The base of a solid ~~area~~ is bound by $x = y^2$ and $x = 2y + 2$ the cross-sections perpendicular to the y-axis are rectangles with height equal to $4y$



$w = dy$

$h = 4y$

$b = 2y+2-y^2$

Bounds

$y^2 = 2y+2$

$y^2-2y-2=0$

$y = -.732, 2.732$

$$A = bh = (2y+2-y^2)(4y)$$

$$V = \int_{-.732}^{2.732} (2y+2-y^2)(4y)\,dy = 27.713$$

or

27.712