The graphs of the functions $f(x) = \sin(x)$ and $g(x) = \frac{1}{2}$ intersect at 2 points on the interval $0 < x < \pi$.

What is the area of the region bound by the graphs of $f(x)$ and $g(x)$ between those points of intersection ?

Choose 1 answer:

(A) $\frac{\pi}{3}$

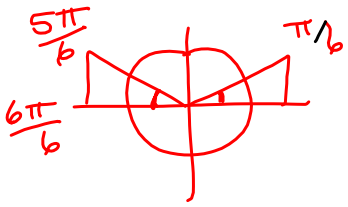
(B) $2 - \frac{\pi}{2}$

(C) $\sqrt{3} - \frac{\pi}{3}$

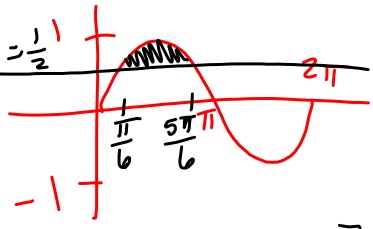
(D) $\frac{\pi}{2}$

$\sin x = \frac{1}{2}$

$x = \frac{\pi}{6}, \frac{5\pi}{6}$



$\int_{\pi/6}^{5\pi/6} \left(\sin x - \frac{1}{2}\right) dx$



$-\cos x - \frac{1}{2}x \Big|_{\pi/6}^{5\pi/6}$

$= \left[-\cos\frac{5\pi}{6} - \frac{1}{2}\left(\frac{5\pi}{6}\right)\right] - \left[-\cos\frac{\pi}{6} - \frac{1}{2}\left(\frac{\pi}{6}\right)\right]$

$= \frac{\sqrt{3}}{2} - \frac{5\pi}{12} + \frac{\sqrt{3}}{2} + \frac{\pi}{12}$

$= \sqrt{3} - \frac{\pi}{3}$

What is the total area of the regions bound by the graphs of $f(x) = (x-2)^3$ and $g(x) = x - 2$?

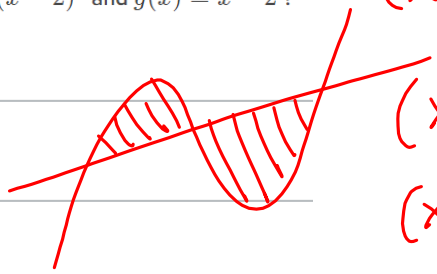
Choose 1 answer:

(A) 0

(B) $\frac{1}{4}$

(C) 2

(D) $\frac{1}{2}$



$(x-2)^3 = (x-2)$

$(x-2)^3 - (x-2) = 0$

$(x-2)\left[(x-2)^2 - 1\right] = 0$

$x - 2 = 0 \quad , (x-2)^2 = 1$

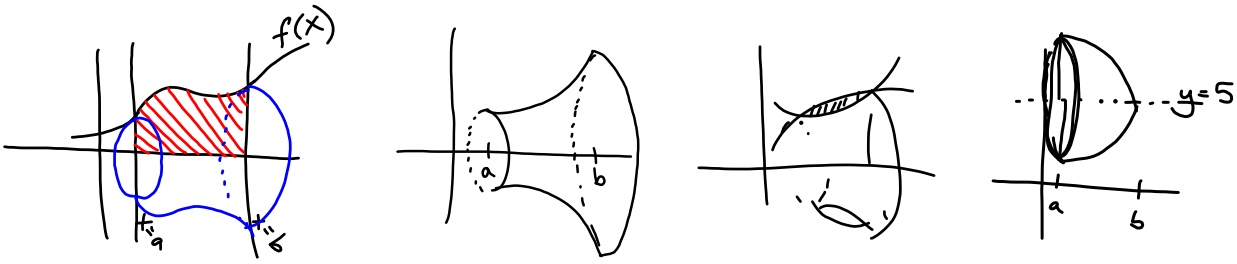
$x = 2 \qquad x - 2 = \pm 1$

$x - 2 = 1 \qquad x - 2 = -1$

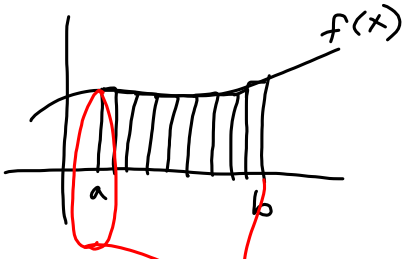
$x = 3 \qquad x = 1$

$\int_1^2 \left[(x-2)^3 - (x-2)\right] dx + \int_2^3 \left[(x-2) - (x-2)^3\right] dx$

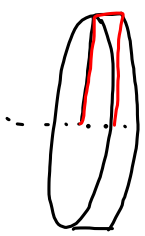
7.2 Volume of Solids of Revolution



7.2 - Volumes of Solids of Revolution



$$\int_a^b \pi \left(f(x)\right)^2 \cdot dx$$



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

$w = \Delta x = dx$

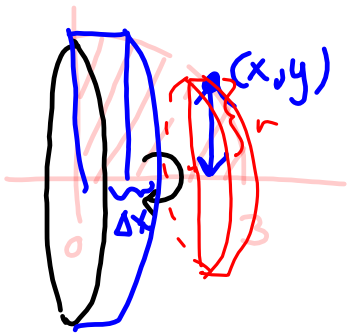
$$\int_a^b \pi r^2 \cdot dx$$

r = some function of f

6.2

Set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the x-axis.

4. $y=\sqrt{9-x^2}$, y-axis , x-axis



$$\int_0^3 \pi\left(\sqrt{9-x^2}\right)^2 dx$$

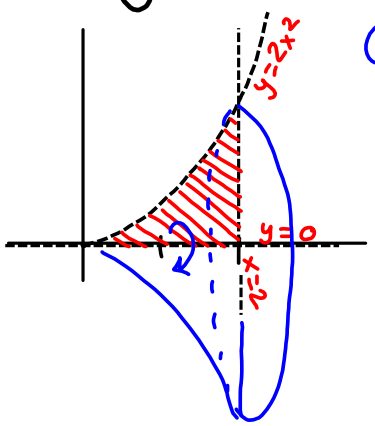
$$= \pi\int_0^3 (9-x^2)dx = \pi\left(9x-\frac{1}{3}x^3\right)\Big|_0^3$$

$$= \pi(27-9)-0$$

$$= \boxed{18\pi}$$

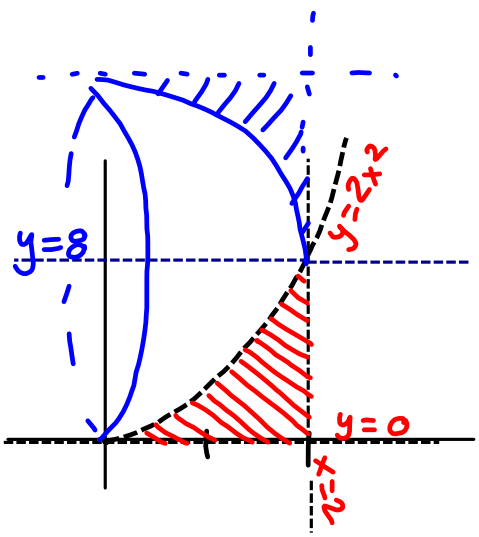
Find the volume of the solid generated by revolving the region bounded by the graphs of the equations:

12. $y=2x^2$, $y=0$, $x=2$



(b) x-axis: $\int_0^2 \pi(2x^2)^2 dx$

Find the volume of the solid generated by revolving the region bounded by the graphs of the equations:



(c) $y=8$

: volume of cylinder − volume of bowl

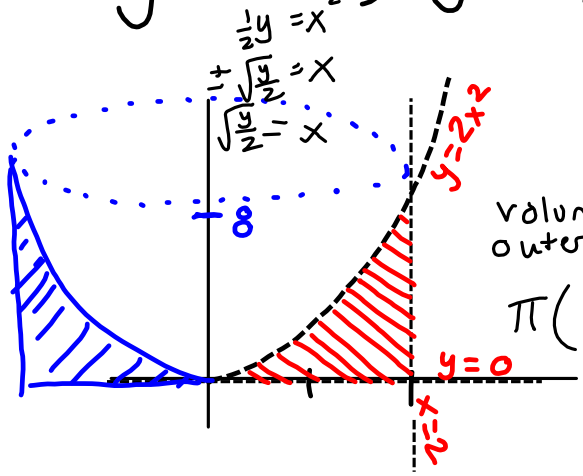
$\pi r^2 h - \int_0^2 \pi (8-2x^2)^2 dx$

$\pi(8)^2 \cdot 2 -$ (distance from center of rotation)

$= 128\pi - \pi \int_0^2 (64 - 32x^2 + 4x^4)\, dx$

Find the volume of the solid generated by revolving the region bounded by the graphs of the equations:

12. $y = 2x^2$, $y = 0$, $x = 2$



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

$\pm\sqrt{\frac{y}{2}} = x$

$\sqrt{\frac{y}{2}} = x$

(a) y-axis

$x = \sqrt{y/2}$

volume of outer cylinder − volume of inner bowl

$\pi(2)^2 \cdot 8 - \int_0^8 \pi \left(\sqrt{\frac{y}{2}}\right)^2 dy$