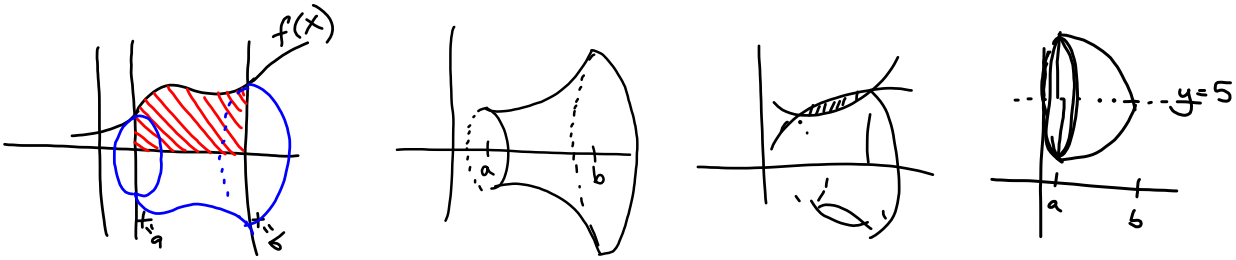
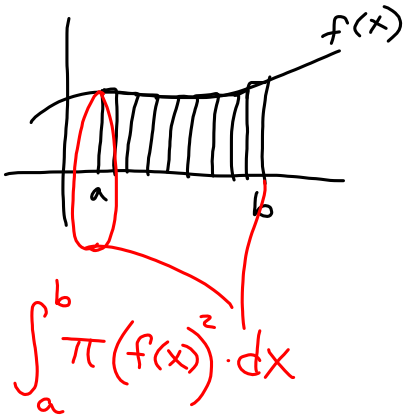
7.1 #1-9 odd; 19, 37

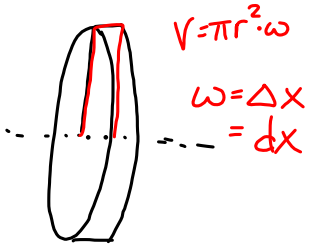
7.2 #11, 13, 17, 19, 21, 25, 29, 37

7.2 Volume of Solids of Revolution





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

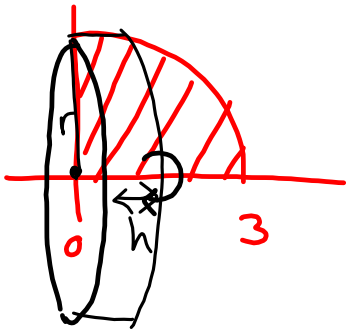


$$\int_a^b \pi r^2 \cdot dx$$

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



height = dx

radius = $\sqrt{9-x^2}$

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

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

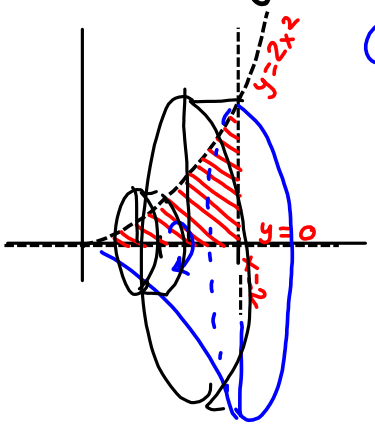
$$= \pi \left(27 - \frac{1}{3}(27)\right) - \pi(0)$$

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

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

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

about the line: (a) y-axis, (b) x-axis, (c) $y = 8$, (d) $x = 2$



(b) x-axis

$$\int_0^2 \pi (2x^2)^2 \, dx = \int_0^2 4\pi x^4 \, dx$$

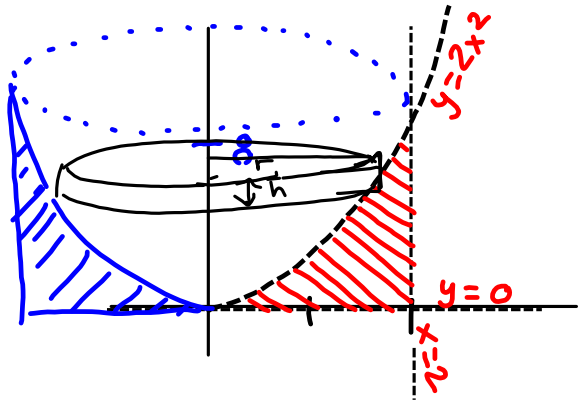
$$= \frac{4\pi}{5} x^5 \Big|_0^2 = \boxed{\frac{128\pi}{5}}$$

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

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

(a) y-axis

$x = \sqrt{y/2}$



Volume of solid = volume of outer cylinder minus volume of "inside of bowl"

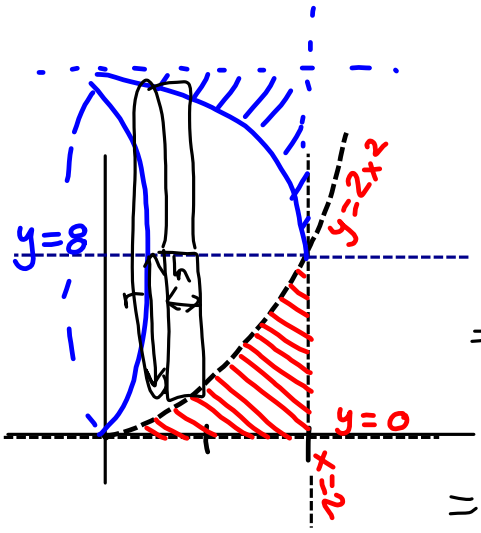
$V = \pi(2)^2(8)$

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

$$V = 32\pi - \int_0^8 \pi y/2 \, dy$$

$$= 32\pi - \frac{\pi y^2}{4} \Big|_0^8 = 32\pi - (16\pi) = \boxed{16\pi}$$

(c) $y=8$



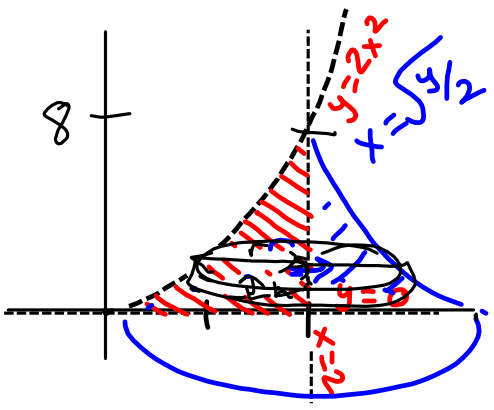
$V_{outer\,cylinder} - V_{bowl}$

$$\pi(8)^2 \cdot 2 - \int_0^2 \pi\left(8-2x^2\right)^2 dx$$

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

$$= 128\pi - \pi\left(64x - \frac{32}{3}x^3 + \frac{4}{5}x^5\right)\Big|_0^2$$

$$= 128\pi - \pi\left(128 - \frac{256}{3} + \frac{128}{5}\right) = \boxed{\frac{256\pi}{3} - \frac{128\pi}{5}}$$



(d) $x=2$

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

$$= \pi\int_0^8 \left(4 - 4\sqrt{\frac{y}{2}} + \frac{y}{2}\right)dy$$

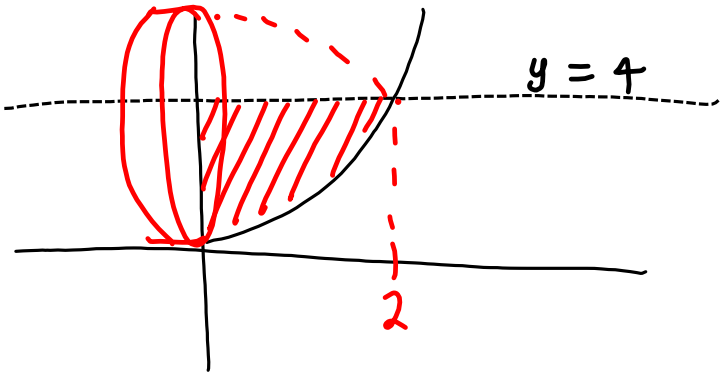
$\frac{4}{\sqrt{2}}y^{1/2}$ $\qquad \frac{\sqrt{2}}{\sqrt{2}\sqrt{2}}\cdot\frac{4}{3}\cdot\frac{2}{3}y^{3/2}$

$$= \pi\left(4y - \frac{4\sqrt{2}}{3}y^{3/2} + \frac{y^2}{4}\right)\Big|_0^8$$

$$= \boxed{32\pi - \pi\frac{4\sqrt{2}}{3}(8)^{3/2} + 16\pi}$$

16. $y = \frac{1}{2}x^3$, $y = 4$, $x = 0$

rotate about $y = 4$



$$\int_0^2 \pi\left(4 - \tfrac{1}{2}x^3\right)^2 dx$$