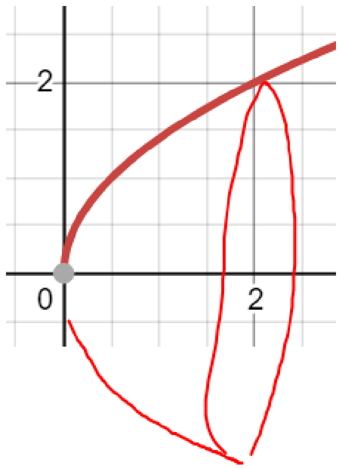
1. Find the volume of the solid generated by revolving $f(x) = \sqrt{2x}$ from $x = 0$ to $x = 2$ around the x-axis.



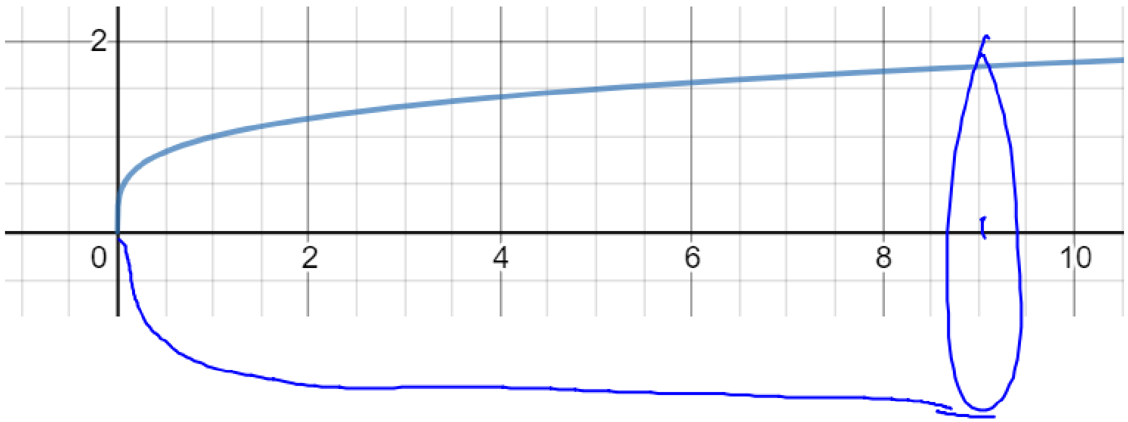
$r = \sqrt{2x}$

$$\pi \int_0^2 2x \, dx$$

$$= \pi \left[x^2 \right]_0^2 = \pi \left[4 - 0 \right]$$

$$= \boxed{4\pi \text{ units}^3}$$

2. Find the volume of the solid generated by revolving $f(x) = \sqrt[4]{x}$ from $x = 0$ to $x = 9$ around the x-axis.



$$\pi \int_0^9 \sqrt{x}\, dx$$

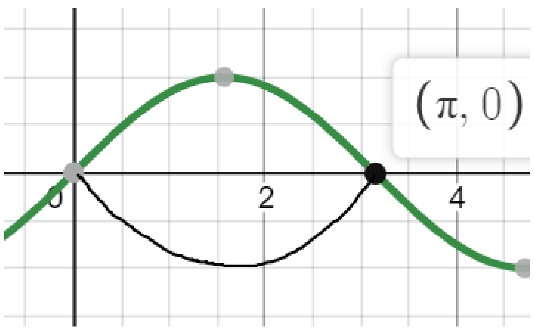
$r = \sqrt[4]{x}$

$r^2 = \sqrt{x}$

$$= \pi \left[\frac{2}{3} x^{\frac{3}{2}} \right]_0^9$$

$$= \pi \left[18 - 0 \right] = \boxed{18\pi \text{ units}^3}$$

3. Find the volume of the solid generated by revolving the first arch of $f(x) = \sin x$ in the first quadrant around the x-axis.



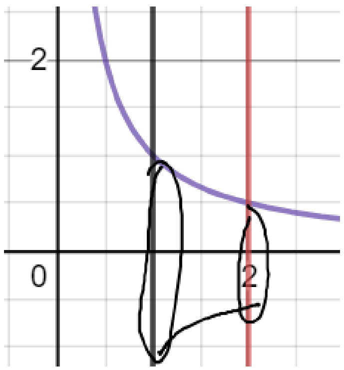
$r = \sin x$

$$\pi \int_0^\pi \sin^2 x \, dx = \pi \int_0^\pi \frac{1}{2}(1 - \cos 2x) \, dx$$

$$= \frac{\pi}{2}\left[x - \frac{1}{2}\sin 2x\right]_0^\pi$$

$$= \frac{\pi}{2}\left[\pi - 0 - (0 - 0)\right] = \boxed{\frac{\pi^2}{2} \text{ units}^3}$$

4. Find the volume of the solid generated by revolving the region bounded by the x-axis, $f(x) = \frac{1}{x}$, $x = 1$, and $x = 2$ around the x-axis.

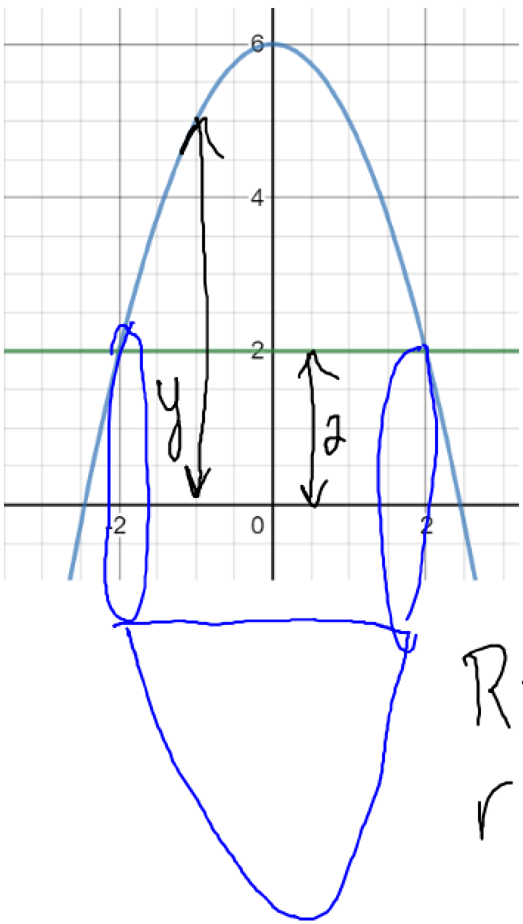


$r = \frac{1}{x}$

$$\pi \int_1^2 \frac{1}{x^2}\,dx = \pi\left[-\frac{1}{x}\right]_1^2$$

$$= \pi\left[-\frac{1}{2} - (-1)\right] = \boxed{\frac{\pi}{2} \text{ units}^3}$$

5. Find the volume of the solid generated by revolving the region between $y = 6 - x^2$ and $y = 2$ around the x-axis.



$6 - x^2 = 2$

$x^2 = 4$

$x = \pm 2$

$R = y = 6 - x^2$

$r = 2$

$$\pi \int_{-2}^{2} (6 - x^2)^2 - 2^2 \, dx$$

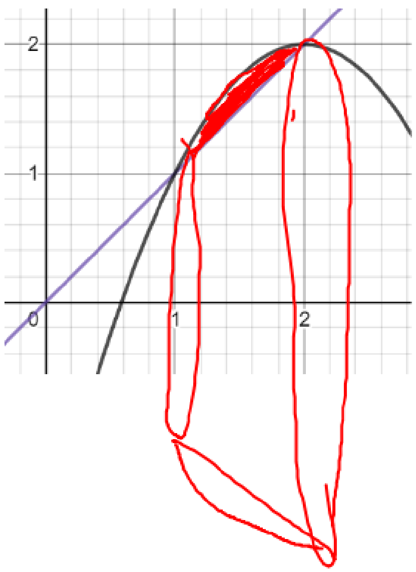
$$= \pi \int_{-2}^{2} 36 - 12x^2 + x^4 - 4 \, dx$$

$$= \pi \left[32x - 4x^3 + \frac{x^5}{5} \right]_{-2}^{2}$$

$$= \pi \left[64 - 32 + \frac{32}{5} - \left(-64 + 32 - \frac{32}{5} \right) \right]$$

$$= \pi \left(64 + \frac{64}{5} \right) = \boxed{\frac{384\pi}{5} \text{ units}^3}$$

6. Find the volume of the solid generated by revolving the region between $y = x$ and $y = -x^2 + 4x - 2$ around the x-axis.



$R = -x^2+4x-2$

$r = x$

$-x^2+4x-2=x$

$x^2-3x+2=0$

$(x-2)(x-1)$

$x=2 \quad x=1$

$$\pi\int_1^2 (-x^2+4x-2)^2 - x^2\,dx$$

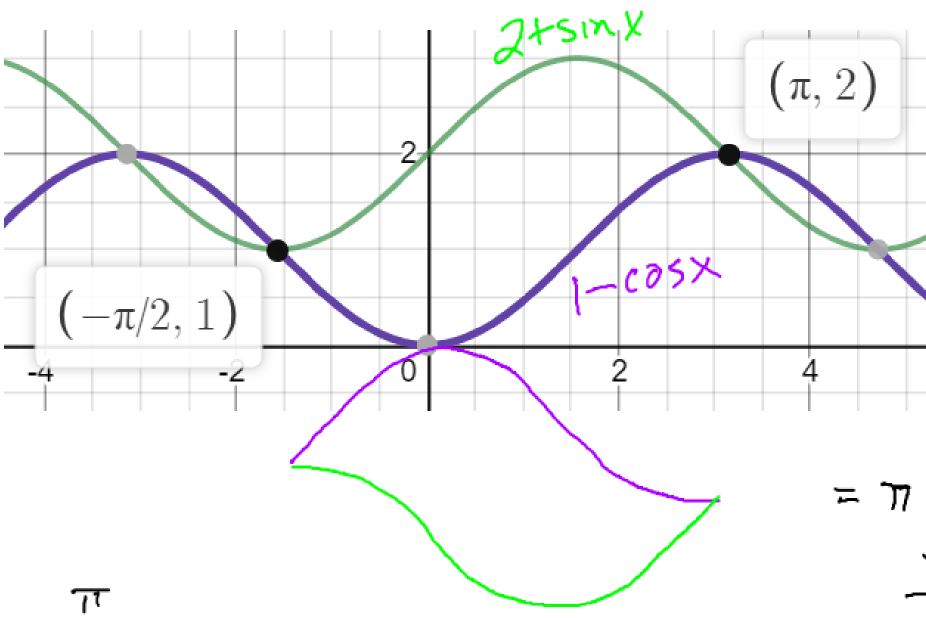
$$=\pi\int_1^2 x^4-8x^3+19x^2-16x+4\,dx$$

$$=\pi\left[\frac{x^5}{5}-2x^4+\frac{19}{3}x^3-8x^2+4x\right]_1^2$$

$$=\pi\left[\frac{32}{5}-32+\frac{152}{3}-32+8-\left(\frac{1}{5}-2+\frac{19}{3}-8+4\right)\right]$$

$$=\pi\left[\frac{31}{5}-50+\frac{133}{3}\right]=\pi\left[\frac{93}{15}-\frac{750}{15}+\frac{665}{15}\right]=\boxed{\frac{8\pi}{15}\text{ units}^3}$$

7. Find the volume of the solid generated by revolving the region between $f(x) = 2 + \sin x$ and $f(x) = 1 - \cos x$ from $x = -\frac{\pi}{2}$ to $x = \pi$ around the x-axis.



$$\pi\int_{-\frac{\pi}{2}}^{\pi} (2+\sin x)^2 - (1-\cos x)^2\,dx$$

$$= \pi\int_{-\frac{\pi}{2}}^{\pi} (4 + 4\sin x + \sin^2 x - 1 + 2\cos x - \cos^2 x)\,dx$$

$$= \pi\int_{-\frac{\pi}{2}}^{\pi} 3 + 4\sin x + \frac{1}{2}(1-\cos 2x) + 2\cos x - \frac{1}{2}(1+\cos 2x)\,dx$$

$$= \pi\int_{-\frac{\pi}{2}}^{\pi} 3 + 4\sin x - \cos 2x + 2\cos x\,dx$$

$$= \pi\left[3x - 4\cos x - \frac{1}{2}\sin 2x + 2\sin x\right]_{-\frac{\pi}{2}}^{\pi}$$

$$= \pi\left[3\pi + 4 - 0 + 0 - \left(-\frac{3\pi}{2} - 0 - 0 - 2\right)\right] = \boxed{\frac{9\pi^2}{2} + 6\pi \text{ units}^3}$$