Find the volume of the object generated by revolving

and about the x-axis.

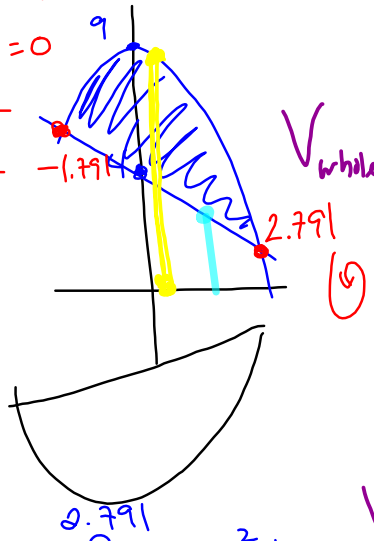
$y = 4 - x \quad y = 9 - x^2$

$4 - x = 9 - x^2$

$x^2 - x - 5 = 0$

$\frac{1 \pm \sqrt{1 - (-20)}}{2}$

$\frac{1 \pm \sqrt{21}}{2}$



whole − hole

$V_{whole} = \pi \int_{-1.791}^{2.791} (9 - x^2)^2 \, dx$

$V_{whole} = 765.867$

$V_{hole} = \pi \int_{-1.791}^{2.791} (4 - x)^2 \, dx$

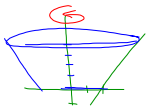
$V_{hole} = 201.521$

564.346

Pail

$y = \frac{3}{2}x - 3$ $\quad x = \frac{2}{3}(y+3)$

and x = 0 about the y-axis from y = 0 to y = 4



$\pi \int_0^4 \left(\frac{2}{3}(y+3)\right)^2 dy$

$\frac{4\pi}{9} \int_0^4 (y+3)^2 \, dy$

$\frac{4\pi}{9} \int_0^4 y^2 + 6y + 9 \, dy$

$\frac{4\pi}{9} \left(\frac{y^3}{3} + \frac{6y^2}{2} + 9y\right)\Big|_0^4$

$\frac{4\pi}{9} \left(\frac{64}{3} + 48 + 36\right)$

$\frac{4\pi}{9} \left(\frac{64}{3} + 84\right)$

$\frac{4\pi}{9} \left(\frac{64 + 252}{3}\right)$

$\frac{4\pi}{9} \left(\frac{316}{3}\right) = \frac{1264\pi}{27}$

9. $\pi \int_0^1 \tan^2\left(\frac{\pi}{4}y\right)\,dy$

$\pi \int_0^1 \sec^2\left(\frac{\pi}{4}y\right) - 1 \;\; dy$

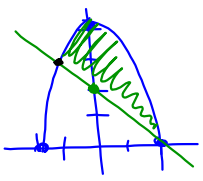
$\pi\left(\frac{4}{\pi}\tan\left(\frac{\pi}{4}y\right) - y\right)\Big|_0^1$

$\pi\left(\left(\frac{4}{\pi}(1)\right) - 1\right)$

$4 - \pi$

18. $y = 4 - x^2 = (2+x)(2-x)$

$y = 2 - x \qquad 4 = x^2$



$\pi \int_{-1}^{2} (4-x^2)^2 - (2-x)^2$

$\pi \int_{-1}^{2} \left(16 - 8x^2 + x^4 - (4 - 4x + x^2)\right)$

$\pi \int_{-1}^{2} \left(x^4 - 9x^2 + 4x + 12\right) dx$

10. $\int_0^{\frac{\pi}{2}} \sin^2 x \cos^2 x \, dx$ $\sin x \cos x = 0$

$\sin x = 0$ $\cos x = 0$

0 $\frac{\pi}{2}$

$\left(\frac{1-\cos 2x}{2}\right)\left(\frac{1+\cos 2x}{2}\right)$

$\frac{1}{4}\left(1-\cos 2x\right)\left(1+\cos 2x\right)$

$\frac{1}{4}\left(1-\cos^2 2x\right)$

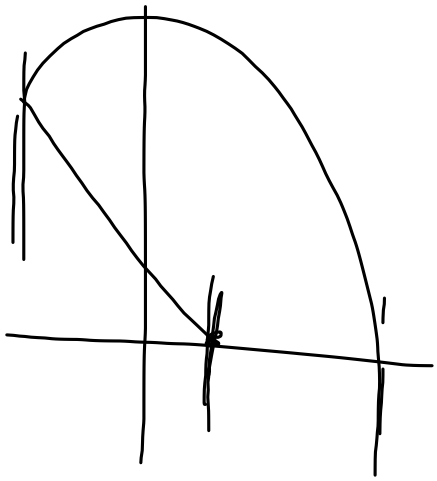
$\frac{1}{4}\sin^2 2x$

$\frac{1}{4}\left(\frac{1-\cos 2(2x)}{2}\right)$

$\int_0^{\frac{\pi}{2}} \frac{1}{8}\left(1-\cos 4x\right)dx$

$\frac{1}{8}\left(x-\frac{\sin 4x}{4}\right)_0^{\frac{\pi}{2}}$

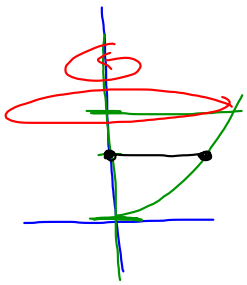
$\frac{1}{8}\left(\left(\frac{\pi}{2}-0\right)-(0)\right) = \frac{\pi^2}{16}$



$\sin 4x$

$(\cos 4x)4$

Rotate around the y-axis $\pm\sqrt{y} = \sqrt{x^2}$ and x = 0 from y = 0, y = 2



$\pi \int_0^2 (\sqrt{y})^2 \, dy$

$\pi \int_0^2 y \, dy$

$\pi \left(\frac{y^2}{2} \Big|_0^2 \right)$

2π