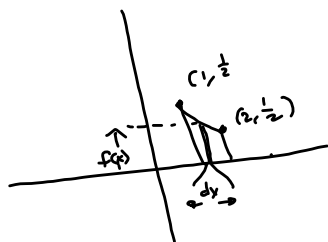
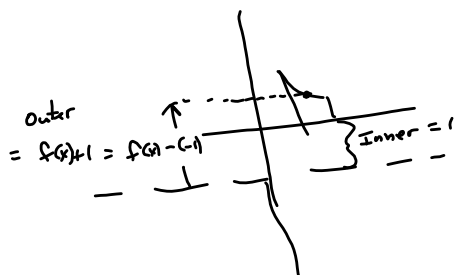


Region bdd by $y = \frac{1}{x}$, $y=0$, $x=1$, $x=2$



$$\text{Area} = \int_1^2 \frac{1}{x} dx = \ln|x| \Big|_1^2 = \ln(2) - \ln(1) = \ln(2)$$

Revolve about $y = -1$



$$\pi \int_1^2 (\text{outer}^2 - \text{inner}^2) dx$$

$$= \pi \int_1^2 \left(\left(\frac{1}{x} + 1 \right)^2 - 1^2 \right) dx$$

$$= \pi \int_1^2 \left(\frac{1}{x^2} + \frac{2}{x} + 1^2 - 1 \right) dx$$

$$= \pi \int_1^2 (x^{-2} + 2x^{-1}) dx$$

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

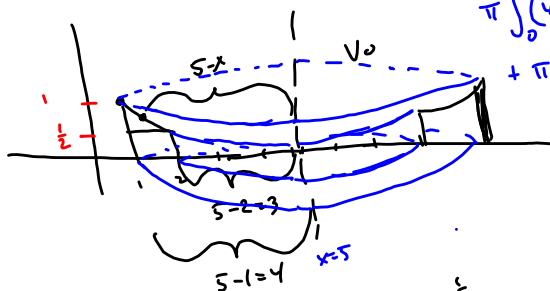
$$= \pi \left[\left[\frac{x^{-1}}{-1} \right]_1^2 + 2\pi \ln|x| \right]_1^2$$

$$= \pi \left[-\frac{1}{2} - \left(-\frac{1}{1} \right) \right] + 2\pi [\ln(2) - 0]$$

$$= \pi \left[\frac{1}{2} \right] + 2\pi \ln(2)$$

$$= \boxed{\frac{3\pi}{2} + 2\ln(2)\pi}$$

About $x=5$



$$\pi \int_{\frac{1}{2}}^1 (y^2 - 3^2) dy$$

$$+ \pi \int_{\frac{1}{2}}^1 (y^2 - (5-x)^2) dy = I_1 + I_2$$

$$y = \frac{1}{x} \Rightarrow x = \frac{1}{y}$$

$\Rightarrow$ sweet!

$f = f^{-1}$!

$$I_1 = \pi \int_{\frac{1}{2}}^1 (16 - 9) dy = 7\pi \int_{\frac{1}{2}}^1 dy = 7\pi [y]_{\frac{1}{2}}^1 = 7\pi \left[\frac{1}{2} \right] = \frac{7\pi}{2}$$

$$I_2 = \pi \int_{\frac{1}{2}}^1 (y^2 - (5 - \frac{1}{y})^2) dy = \pi \int_{\frac{1}{2}}^1 (16 - 25 + \frac{10}{y} + \frac{1}{y^2}) dy$$

$$= \pi \int_{\frac{1}{2}}^1 (-9 + \frac{10}{y} + y^{-2}) dy = \pi \left[-9y + 10\ln(y) - (1 - 2y) \right]_{\frac{1}{2}}^1$$

$$= \pi \left[-9 - \left(-\frac{9}{2} \right) + 10\ln(1) - 10\ln\left(\frac{1}{2}\right) - (1 - 2) \right]$$

$$= \pi \left[-\frac{9}{2} - 10\ln\left(\frac{1}{2}\right) + 1 \right] = \pi \left[-\frac{7}{2} + 10\ln(2) \right]$$

Probably shot thru w/ errors.