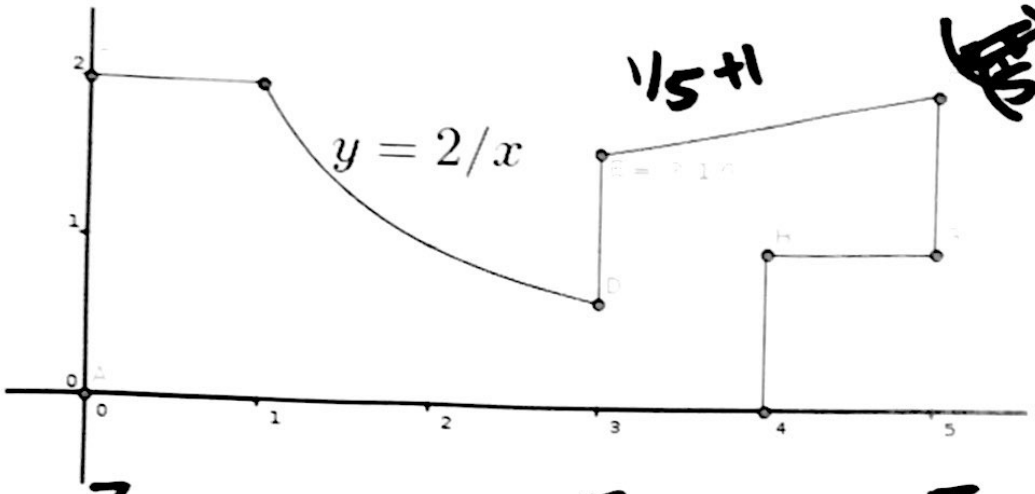
Assignment 16: Due Mon Nov 20th

When the region below is revolved about the x-axis, it will create a three-dimensional chess rook. Write a series of integrals to represent the volume of the resulting solid, and calculate it. Give an exact form and an approximation.

(The function y = 2/x defines the curve from C to D. All other segments are linear.)



$$\int_0^1 \frac{x}{2} + \int_1^3 \left(\frac{2}{x}\right) + \int_3^5 \left(\frac{1}{5}x+1\right) + \int_4^5 (1)$$

$$\int_0^1 (2)^2\pi + \int_1^3 \pi\left(\frac{2}{x}\right)^2 + \int_3^5 \pi\left(\frac{1}{5}x+1\right)^2 - \int_4^5 \pi(1)^2$$

$$\pi\left[\int_0^1 4 + \int_1^3 \left(\frac{2}{x}\right)^2 + \int_3^5 \left(\frac{1}{5}x+1\right)^2 - \int_4^5 \right]$$

$$\pi\left[4 + \frac{-4}{x}\Big|_1^3 + \left(\frac{x^3}{75} + \frac{x^2}{5} + x\right)\Big|_3^5 - 1\right]$$

$$\pi\left[4 + 8/3 + \frac{4}{75} - 1\right] = \boxed{\frac{913\pi}{75}}$$