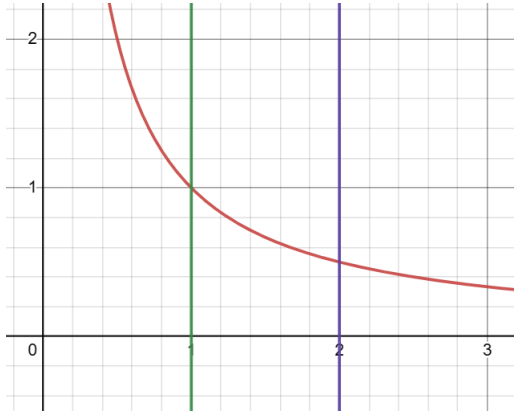# Integration – Q8: Volume of Revolution (21/11/23)

The region bounded by the curve $y = \dfrac{1}{x}$, the lines $x = 1, x = 2$, and the x-axis is rotated about the y-axis through 360°. Find the volume generated.

Solution

The region can be divided into two parts: the rectangle at the bottom, with base 1 and height $\frac{1}{2}$ (A), and the remainder (B).

Volume $= \pi(2^2 - 1^2)\left(\frac{1}{2}\right) + \pi \int_{\frac{1}{2}}^{1} x^2 - 1^2 dy$

$= \frac{3\pi}{2} + \pi \int_{\frac{1}{2}}^{1} y^{-2} - 1^2 dy$

$= \frac{3\pi}{2} + \pi[-y^{-1} - y]_{\frac{1}{2}}^{1}$

$= \frac{3\pi}{2} + \pi(-2 - [-\frac{5}{2}])$

$= 2\pi$