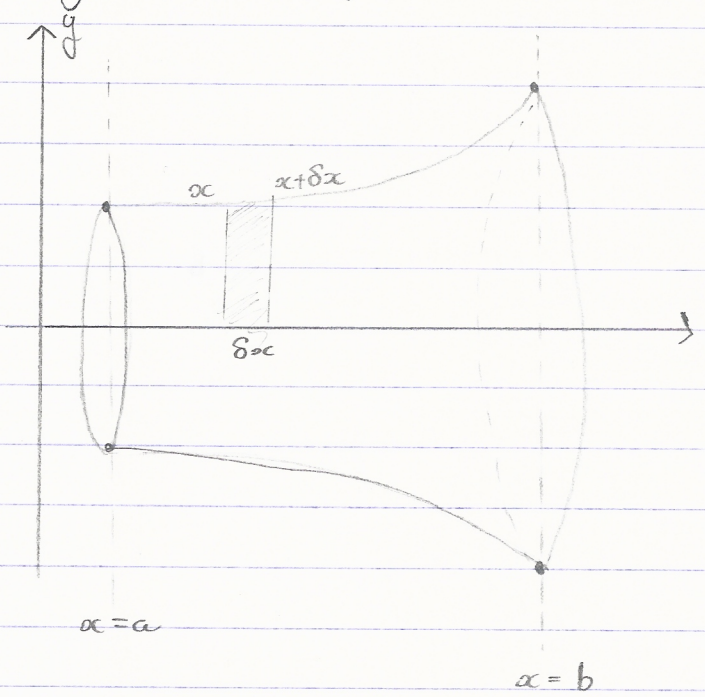
Deriving Volumes of Revolution Formula



The volume of a cylinder is denoted by $V = \pi r^2 h$

The volume of the solid formed by ~~rotated~~ rotating the shaded area 2π radians around the x-axis is denoted by δV.

This lies between: $\pi y^2 \delta x \leq \delta V \leq \pi (y+\delta y)^2 \delta x$

$$\Rightarrow \pi y^2 \leq \frac{\delta V}{\delta x} \leq \pi (y+\delta y)^2$$

as $\delta x \to 0$, $\delta y \to 0$ too & $\frac{\delta V}{\delta x} \to \frac{dV}{dx}$

so $\frac{dV}{dx} = \pi y^2$

$$\int \frac{dV}{dx}\, dx = \int 1\, dV$$

$$\int \pi y^2\, dx = V$$