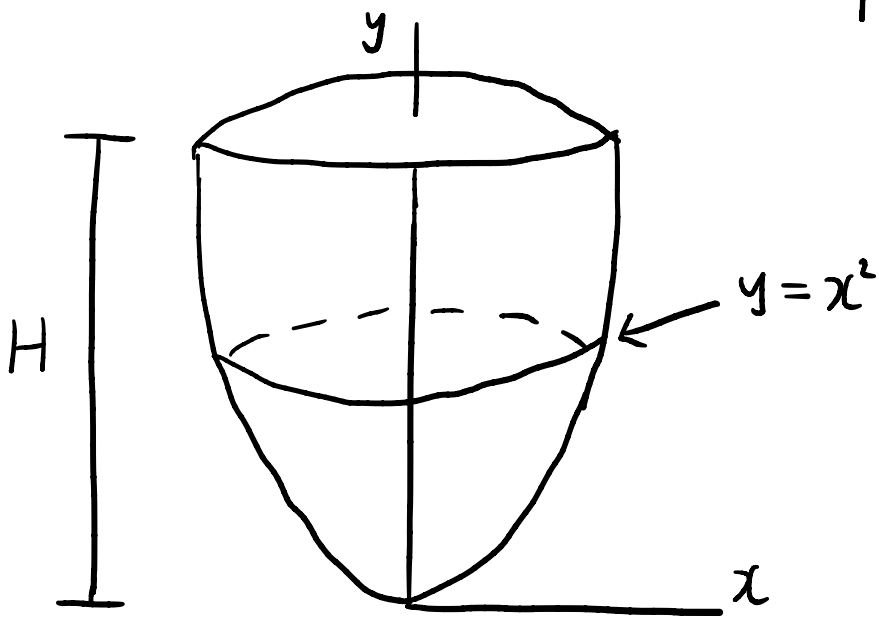
Find the volume of the paraboloid:



Find the volume of the paraboloid:

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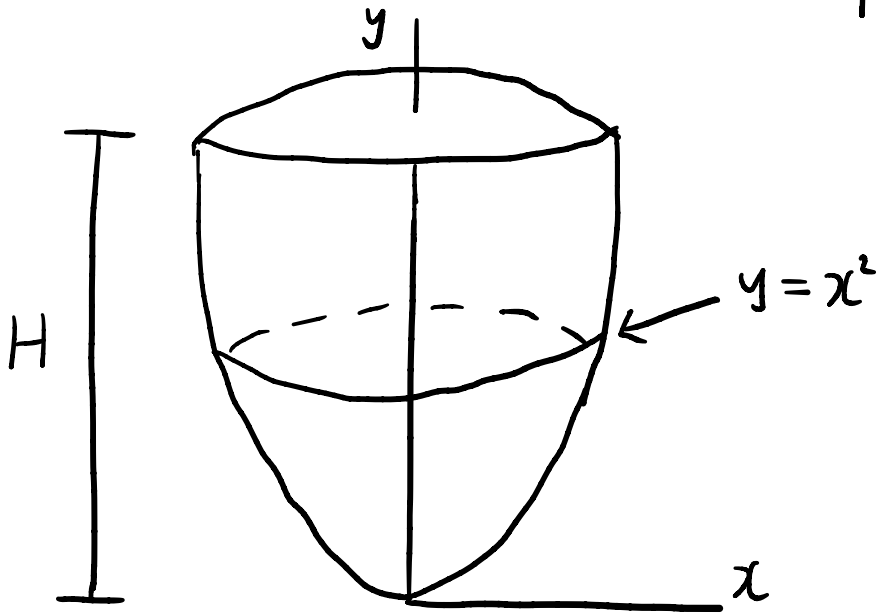

$$\Delta y = \frac{b-a}{n} = \frac{H}{n}$$

$x^2 = y$

$\Rightarrow x = \pm\sqrt{y}$

$r = \sqrt{y}$

Volume of n cylinders: $\sum_{i=1}^{n} \pi r_i^2 h$

$c_i = (i-1)\Delta y$

$f(c_i) = r_i = \sqrt{(i-1)\Delta y}$

$h = \Delta y$

$$\Rightarrow \text{Volume} = \lim_{n\to\infty} \sum_{i=1}^{n} \pi r_i^2 h$$

$$= \pi \lim_{n\to\infty} \sum_{i=1}^{n} r_i^2 \Delta y$$

$$= \pi \int_0^H r^2 \, dy$$

$$= \pi \int_0^H y \, dy$$

$$= \frac{\pi}{2} y^2 \Big|_0^H$$

$$= \frac{\pi}{2} H^2$$