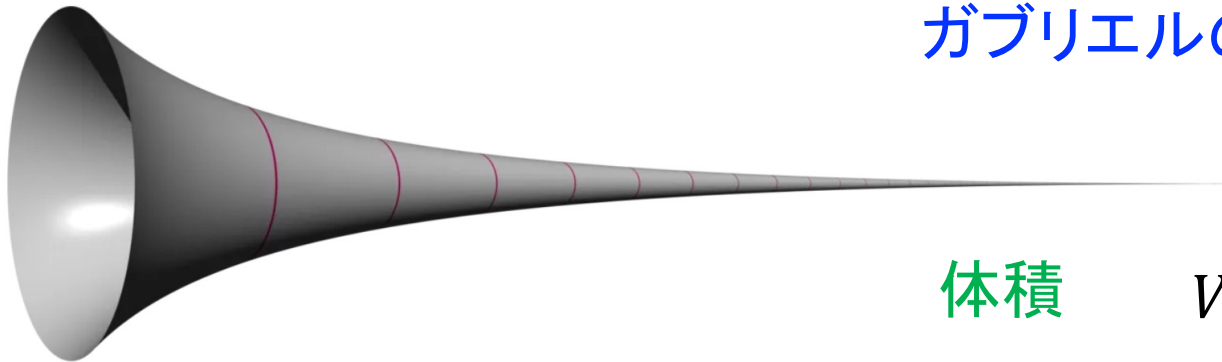
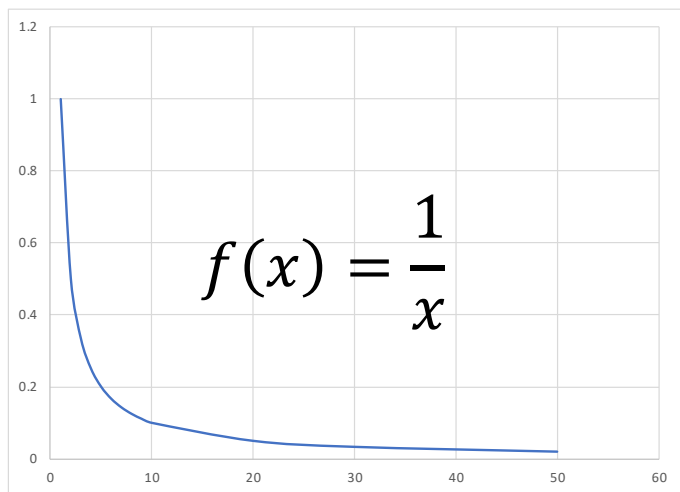


ガブリエルのラッパ



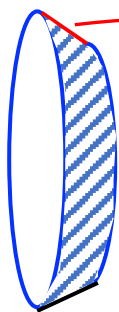
体積

$$\begin{aligned} V &= \pi \int_1^{\infty} \frac{1}{x^2} dx = \lim_{n \rightarrow \infty} \pi \int_1^n \frac{1}{x^2} dx \\ &= \lim_{n \rightarrow \infty} \pi \left[-\frac{1}{x} \right]_1^n = \lim_{n \rightarrow \infty} \pi \left(-\frac{1}{n} + 1 \right) \\ &= \pi \end{aligned}$$



断面積

$$\begin{aligned} A_c &= \int_1^{\infty} \frac{1}{x} dx = \lim_{a \rightarrow \infty} \int_1^a \frac{1}{x} dx \\ &= \lim_{a \rightarrow \infty} [\ln x]_1^a = \lim_{a \rightarrow \infty} \ln a = \infty \end{aligned}$$



$f'(x)\Delta x$ Δx $\sqrt{1 + f'(x)^2}\Delta x$

表面積 $A = 2\pi \int_1^{\infty} \frac{1}{x} \sqrt{1 + f'(x)^2} dx > 2\pi A_c = \infty$