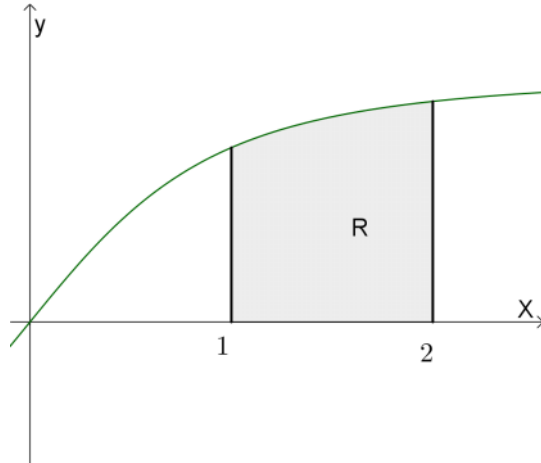


The following diagram shows the graph of  $f(x) = \frac{4x}{\sqrt{x^2+1}}$

Let  $R$  be the region bounded by  $f$ , the x-axis,  $x = 1$  and  $x = 2$



Find  $R$

$$A = \int_a^b y \, dx$$

$$\text{Area} = \int_{x=1}^{x=2} \frac{2 \cdot 2x}{\sqrt{x^2+1}} \, dx$$

$$u = x^2 + 1$$

$$\frac{du}{dx} = 2x$$

$$du = 2x \, dx$$

$$\text{Area} = \int_{u=2}^{u=5} \frac{2 \, du}{\sqrt{u}}$$

$$= \int_2^5 2 \cdot u^{-\frac{1}{2}} \, du$$

$$= \left[ 2 \cdot \frac{u^{\frac{1}{2}}}{\frac{1}{2}} \right]_2^5$$

$$= \left[ 4\sqrt{u} \right]_2^5$$

$$= 4\sqrt{5} - 4\sqrt{2}$$

$$= 4(\sqrt{5} - \sqrt{2})$$