

Primeiro limite fundamental: $\lim_{x \rightarrow 0} \frac{\text{sen } x}{x} = 1$

Prova

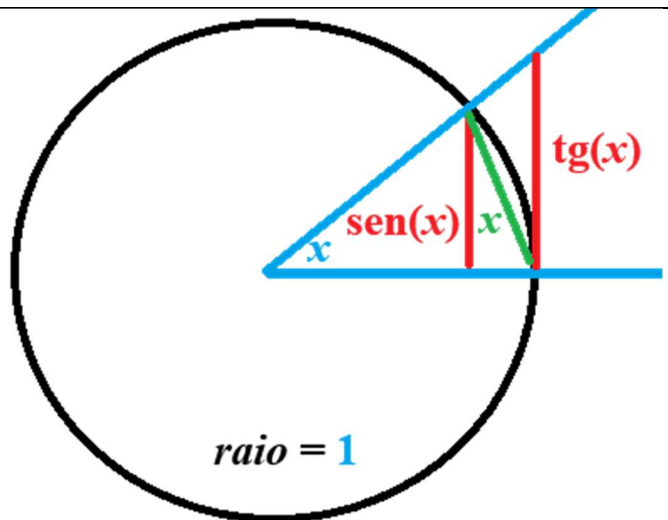
Na figura, nota-se que p/ $x \neq 0$,
 $\text{sen}(x) < x < \text{tg}(x)$

Dividindo por $\text{sen}(x)$, fica

$$\frac{\text{sen } x}{\text{sen } x} < \frac{x}{\text{sen } x} < \frac{\text{tg } x}{\text{sen } x} = \frac{\frac{\text{sen } x}{\cos x}}{\text{sen } x}$$

Ou

$$1 < \frac{x}{\text{sen } x} < \frac{\text{sen } x}{\cos x} \frac{1}{\text{sen } x}$$



$$\text{Ou } 1 < \frac{x}{\text{sen } x} < \frac{1}{\cos x} \rightarrow \lim_{x \rightarrow 0} 1 \leq \lim_{x \rightarrow 0} \frac{x}{\text{sen } x} \leq \lim_{x \rightarrow 0} \frac{1}{\cos x}$$

$$\text{Portanto, } 1 \leq \lim_{x \rightarrow 0} \frac{x}{\text{sen } x} \leq 1 \rightarrow \lim_{x \rightarrow 0} \frac{x}{\text{sen } x} = 1 \rightarrow \lim_{x \rightarrow 0} \frac{\text{sen } x}{x} = 1$$