27. Question Details

In the theory of relativity, the Lorentz contraction formula

$$L = L_0\sqrt{1 - v^2/c^2} \xrightarrow{v \to c} 0$$

expresses the length L of an object as a function of its velo
and c is the speed of light. Find $\lim_{v \to c^-} L$.

Why is a left-hand limit necessary?

Because $v > c$ makes L unreal.

$\lim_{h \to 0} \frac{(x+h)^2 - x^2}{h} =$

$$\frac{(x+h)^2 - x^2}{h} = \frac{x^2 + 2xh + h^2 - x^2}{h} = \frac{2xh + h^2}{h}$$

$$= \frac{h(2x+h)}{h} = 2x + h \xrightarrow{h \to 0} 2x.$$

Big kids pass to the limit, at the end.