Exercise 46

Find the limit, if it exists. If the limit does not exist, explain why.

$$\lim_{x \to 0^+} \left(\frac{1}{x} - \frac{1}{|x|} \right)$$

Solution

Since x approaches 0 from the right, it's slightly positive and $|x|$ is replaced by x.

$$\lim_{x \to 0^+} \left(\frac{1}{x} - \frac{1}{|x|} \right) = \lim_{x \to 0^+} \left(\frac{1}{x} - \frac{1}{x} \right) = \lim_{x \to 0^+} (0) = 0$$

The graph of the function versus x confirms this result.