

The *signum* (or *sign*) function, denoted by  $\operatorname{sgn}$ , is defined by

$$\operatorname{sgn} x = \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 & \text{if } x > 0. \end{cases}$$

Find each of the following limits. If the limit does not exist, enter “DNE” below.

(a)  $\lim_{x \rightarrow 0^+} \operatorname{sgn} x =$

(b)  $\lim_{x \rightarrow 0^-} \operatorname{sgn} x =$

(c)  $\lim_{x \rightarrow 0} \operatorname{sgn} x =$

(d)  $\lim_{x \rightarrow 0} |\operatorname{sgn} x| =$

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