Exercise 10

Find the limit.

$$\lim_{v\to 4^+} \frac{4-v}{|4-v|}$$

Solution

Plugging in 4 right away for v gives 0 in the denominator, so simplify the function first or rewrite the limit.

$$\begin{aligned}\lim_{v\to 4^+} \frac{4-v}{|4-v|} &= \lim_{v\to 4^+} \operatorname{sgn}(4-v) \\ &= \begin{cases} 1 & \text{if } 4-v>0 \\ -1 & \text{if } 4-v<0 \end{cases} \\ &= \begin{cases} 1 & \text{if } v<4 \\ -1 & \text{if } v>4 \end{cases}\end{aligned}$$

Since v is approaching 4 from the right ($v \to 4^+$),

$$\lim_{v\to 4^+} \frac{4-v}{|4-v|} = -1.$$