

$$\begin{aligned}
 1. \quad & \lim_{x \rightarrow -4} \frac{\sqrt{x^2+9} - 5}{x+4} \\
 &= \lim_{x \rightarrow -4} \frac{(x^2+9) - 25}{(x+4)(\sqrt{x^2+9} + 5)} \\
 &= \lim_{x \rightarrow -4} \frac{(x-4)(x+4)}{(x+4)(\sqrt{x^2+9} + 5)} \\
 &= \lim_{x \rightarrow -4} \frac{x-4}{\sqrt{x^2+9} + 5} \\
 &= \frac{-4}{5}
 \end{aligned}$$

$$2. \quad f(x) = \begin{cases} x^2+3 & \text{if } x \leq 0 \\ 3-3x & \text{if } 0 < x < 2 \\ 5 & \text{if } x = 2 \\ 2x-4 & \text{if } x > 2 \end{cases}$$

$$(a) \quad f(0) = 0^2 + 3 = 3$$

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} 3-3x = 3$$

$$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} x^2 + 3 = 3$$

$$\lim_{x \rightarrow 0} f(x) = 3$$

$$(b) \quad f(2) = 5$$

$$\lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2^+} 2x-4 = 0$$

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^-} 3-3x = -3$$

$$\lim_{x \rightarrow 2} f(x) \quad \text{DNE}$$