

## Answer on Question #80053 – Math – Calculus

### Question

$$f(x) = \frac{x^2 - 16}{x^2 + 5x + 4}$$

limit of  $f(x)$  as  $x$  approaches  $-4$  from the left

limit of  $f(x)$  as  $x$  approaches  $-1$

### Solution

So,  $f(x) = \frac{x^2 - 16}{x^2 + 5x + 4}$ . Then

$$\begin{aligned}\lim_{x \rightarrow -4^-} f(x) &= \lim_{x \rightarrow -4^-} \frac{x^2 - 16}{x^2 + 5x + 4} = \lim_{x \rightarrow -4^-} \frac{(x-4)(x+4)}{(x+1)(x+4)} = \\ &= \lim_{x \rightarrow -4^-} \frac{x-4}{x+1} = \lim_{x \rightarrow -4^-} \frac{x-4}{x+1} = \frac{-4-4}{-4+1} = \frac{-8}{-3} = \frac{8}{3},\end{aligned}$$

$$\begin{aligned}\lim_{x \rightarrow -1} f(x) &= \lim_{x \rightarrow -1} \frac{x^2 - 16}{x^2 + 5x + 4} = \lim_{x \rightarrow -1} \frac{(x-4)(x+4)}{(x+1)(x+4)} = \\ &= \lim_{x \rightarrow -1} \frac{x-4}{x+1} = \infty.\end{aligned}$$

**Answer:**

$$\lim_{x \rightarrow -4^-} f(x) = \frac{8}{3},$$

$$\lim_{x \rightarrow -1} f(x) = \infty.$$