
Complete the following problems. Show all work to receive full credit.

1. Calculate the following limits:

(a) $\lim_{x \rightarrow -5^-} \frac{3x}{2x + 10}$

$$\lim_{x \rightarrow -5^-} \frac{3x}{2x + 10} = \frac{\text{negative}}{\text{negative}} = \infty$$

(A graph or table of values is sufficient work for this problem.)

(b) $\lim_{x \rightarrow \frac{\pi}{2}^+} \tan x$

$$\lim_{x \rightarrow \frac{\pi}{2}^+} \tan x = -\infty$$

(A graph is sufficient work for this problem.)

2. At what points is the function $f(x) = \frac{1}{x-2} - 3x$ continuous? Give reasons for your answer.

Since $3x$ is continuous, this part of the function is continuous, and the entire function is continuous if the first piece, $\frac{1}{x-2}$, is continuous. This first piece is continuous whenever the denominator is not zero, since it is a rational function. Therefore, it is continuous when $x \neq 2$. Therefore $f(x)$ is continuous as long as $x \neq 2$.

3. Give an example of a function that satisfies the following conditions:

$$f(0) = 0, f(1) = 2, f(-1) = -2, \lim_{x \rightarrow \infty} f(x) = -1, \lim_{x \rightarrow -\infty} f(x) = 1$$

There are many possible examples for this.