

Answer on Question #53515 – Math – Calculus

Question

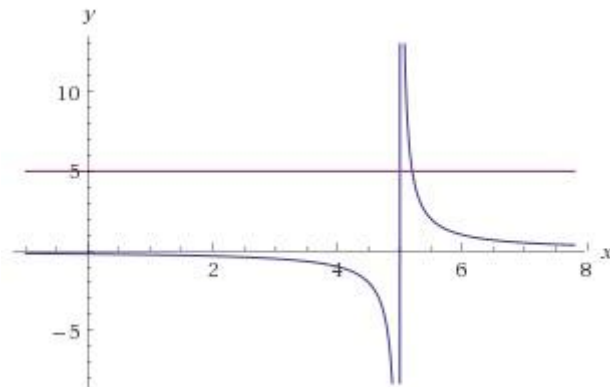
Use graphs and tables to find the limit and identify any vertical asymptotes of limit of 1 divided by the quantity x minus 5 as x approaches 5 from the left.

Solution

The function is $f(x) = 1/(x - 5)$. The table lists the value of $f(x)$ for several x -values approaches 5 from the left.

x	$f(x) = \frac{1}{x-5}$	$[x, f(x)]$
4.5	$f(x) = \frac{1}{4.5-5} = -2$	(4.5, -2)
4.9	$f(x) = \frac{1}{4.9-5} = -10$	(4.9, -10)
4.99	$f(x) = \frac{1}{4.99-5} = -100$	(4.99, -100)
4.999	$f(x) = -1000$	(4.999, -1000)
4.9999	$f(x) = -10000$	(4.9999, -10000)
4.99999	$f(x) = -100000$	(4.99999, -100000)
5	$f(x) = \frac{1}{5-5} = -\infty$	(5, $-\infty$)

The graph of function $f(x) = 1/(x - 5)$ is given below



Observe the graph and table, when x approaches 5 from the left, $(x - 5)$ is a small negative number. Thus, the quotient $1/(x-5)$ is a large negative number and $f(x)$ approaches negative infinity to the left side of $x = 5$. So, we can conclude that $x = 5$ is a vertical asymptote of the graph of $f(x)$ and

$$\lim_{x \rightarrow 5^-} f(x) = \lim_{x \rightarrow 5^-} \frac{1}{x-5} = -\infty.$$