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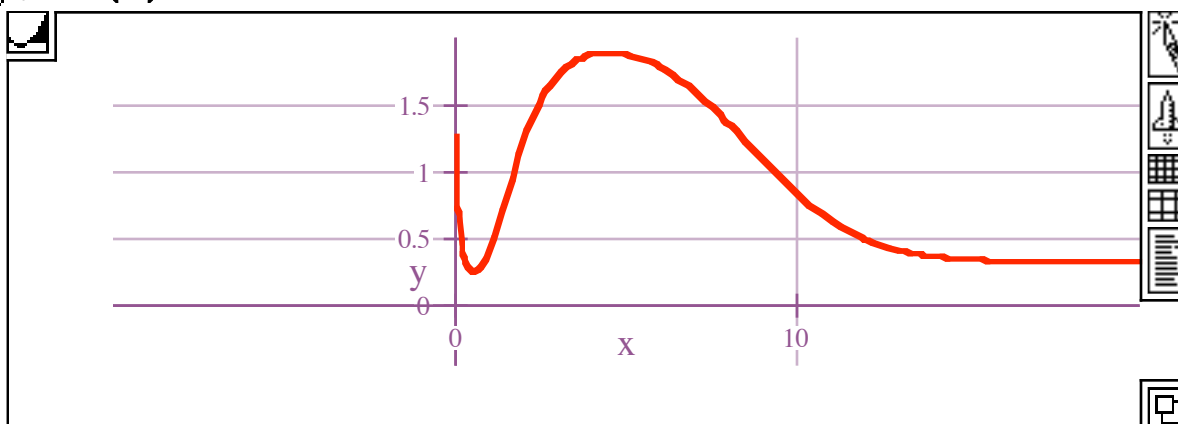
Consider:

$$f(x) = \frac{5x^4 - \log(x) + e^x}{2x^4 + 7x + 3e^x}$$

Describe what $f(x)$ is doing as $x \rightarrow \infty$

$f(x) = \frac{5x^4 - \log(x) + e^x}{2x^4 + 7x + 3e^x}$

$y = f(x)$



Answer:

The graph of the function, $f(x)$, approaches the x -axis. Therefore the height (and value of the function) approach 0. So, the limit of $f(x)$ is 0.



Instructor Response:

That seems like a reasonable guess based on the graph. Let's check and see if it works. If $f[x]$ really does go to zero as x goes to infinity then there is some x way out there for which $f[x] = 0.25$. See if you can find an x that will do the job.



Student Response:

The limit is really 0.333333



Instructor Reply:

You have only checked out to 500. How do you know the function doesn't dip below 0.333333 say out at 100,000,000,000?



Student Response:

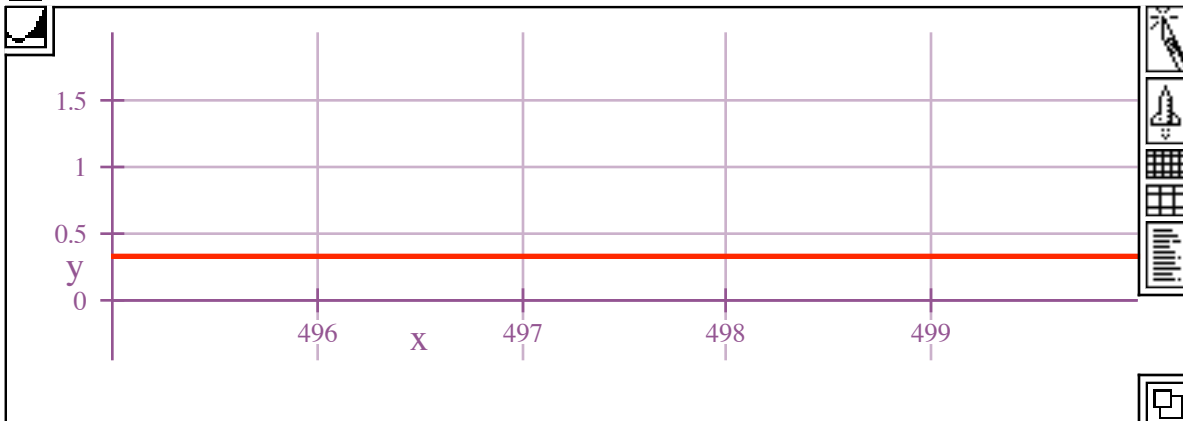
As x gets bigger and bigger the e^x is going to dominate which means the $\log(x)$, $2x^4$, and $7x$ are not going to matter. That leaves us with

$$\frac{e^x}{3e^x} = \frac{1}{3}$$



Instructor Reply:

That sounds really good. Can you make the graph from above look like it is giving additional evidence towards your answer?



Answer: This graph is showing a horizontal line at a height of 0.333333 which agrees with the algebra answer.



Instructor: Excellent! What was it about the previous graph that hid this fact?



Student Response: The previous graph was graphing from -10 to 20 which was too little to show global scale.



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