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07Oct2021. Q: How can I replicate  $\lim_{x \rightarrow -\infty} \frac{f(x)}{g(x)} = \lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$ ? For example, if  $f(x) = \frac{2}{x^2-3x+6}$  and  $g(x) = \frac{1}{x^2-4x+3}$  I would like to show  $\lim_{x \rightarrow -\infty} \frac{f(x)}{g(x)} = \lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = \frac{1}{0}$ , but I am having a lot of trouble actually proving this. I know how to prove  $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = \lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = 0$ , but I can't get much past this. A: Hint. Note that  $\frac{2}{x^2-3x+6} \div \frac{1}{x^2-4x+3} = \frac{2(x^2-4x+3)}{x^3-3x^2+9x-6} = \frac{2(x^2-2x+3)(1-\frac{4}{x^2})}{(1-\frac{3}{x^2})(1-\frac{3}{x^2})}$ . This is how you can approach this. Use a theorem that if you have  $f$  and  $g$  which are continuous on  $[a,b]$  and have no roots on  $[a,b]$ , then  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{f(a)}{g(a)}$ . To prove this, let  $F(x) = f(x)$  and  $G(x) = g(x)$ , so that our question is now  $\lim_{x \rightarrow a} \frac{F(x)}{G(x)}$ . The theorem you're looking for is that if  $F$  and  $G$  are both

