

SCORE: ____ / 10 POINTS

NO CALCULATORS ALLOWED

Evaluate the following limits algebraically. Show all algebraic work.

[a] $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 4} = \lim_{x \rightarrow 2} \frac{(x-2)(x^2+2x+4)}{(x-2)(x+2)}$
 $= \lim_{x \rightarrow 2} \frac{x^2+2x+4}{x+2}$ 2
 $= \frac{2^2+2(2)+4}{2+2} = 3$ 1

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[b] $\lim_{x \rightarrow 8} \frac{2x-16}{\sqrt{x+1}-3} = \lim_{x \rightarrow 8} \frac{(2x-16)(\sqrt{x+1}+3)}{x+1-9}$
 $= \lim_{x \rightarrow 8} \frac{2(x-8)(\sqrt{x+1}+3)}{x-8}$ 2
 $= \lim_{x \rightarrow 8} 2(\sqrt{x+1}+3) = 2(\sqrt{8+1}+3) = 12$ 1

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[c] $\lim_{x \rightarrow 2} \frac{\frac{1}{x^2} - \frac{1}{4}}{\frac{1}{x} - \frac{1}{2}} = \lim_{x \rightarrow 2} \frac{\frac{4-x^2}{4x^2}}{\frac{2-x}{2x}} \cdot \frac{4x^2}{4x^2}$
 $= \lim_{x \rightarrow 2} \frac{4-x^2}{4x-2x^2}$ 2
 $= \lim_{x \rightarrow 2} \frac{(2-x)(2+x)}{2x(2-x)}$ 1
 $= \lim_{x \rightarrow 2} \frac{2+x}{2x} = \frac{2+2}{2(2)} = 1$

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Give an example of functions f and g such that $\lim_{x \rightarrow 0} \frac{f(x)}{g(x)}$ exists, but $\lim_{x \rightarrow 0} f(x)$ and $\lim_{x \rightarrow 0} g(x)$ do not exist. SCORE: ____ / 1 POINT

$f(x) = \frac{1}{x}$
 $g(x) = \frac{1}{x}$

$\frac{f(x)}{g(x)} = 1$

INFINITELY MANY
POSSIBILITIES