

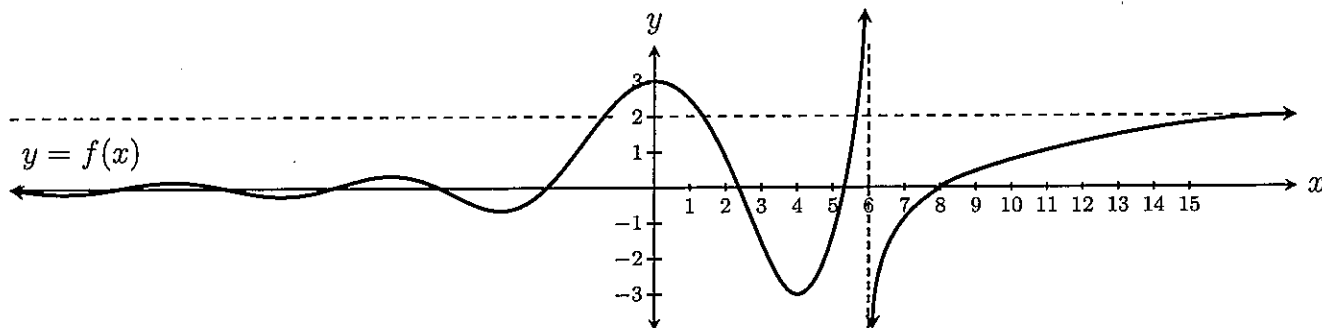
Name: Richard

QUIZ 4 ♣

MATH 200
September 5, 2023

Directions: Find the limits. Show all steps. Simplify your answer.

1. (8 points) Answer the following questions about the function $y = f(x)$ graphed below.



(a) $\lim_{x \rightarrow -\infty} f(x) = \boxed{0}$

(b) $\lim_{x \rightarrow \infty} f(x) = \boxed{2}$

(c) $\lim_{x \rightarrow 6^-} f(x) = \boxed{\infty}$

(d) $\lim_{x \rightarrow 6^+} f(x) = \boxed{-\infty}$

(e) $\lim_{x \rightarrow 0} \frac{1}{f(x) - 3} = \boxed{-\infty}$
approaching 0, negative

(f) $\lim_{x \rightarrow 6} \frac{1}{f(x)} = \boxed{0}$
approaching $\pm\infty$

(g) $\lim_{x \rightarrow 8^-} \frac{1}{f(x)} = \boxed{-\infty}$
approaching 0, negative

(h) $\lim_{x \rightarrow 8^+} \frac{1}{f(x)} = \boxed{\infty}$
approaching 0, positive

2. (4 points) $\lim_{x \rightarrow \infty} e^{1/x} = e^{\lim_{x \rightarrow \infty} \frac{1}{x}} = e^0 = \boxed{1}$

3. (4 points) $\lim_{x \rightarrow \infty} \frac{x^2 + 2x + 1}{-x^2 + 4x + 5} = \lim_{x \rightarrow \infty} \frac{x^2 + 2x + 1}{-x^2 + 4x + 5} \cdot \frac{\frac{1}{x^2}}{\frac{1}{x^2}}$
 $= \lim_{x \rightarrow \infty} \frac{1 + \frac{2}{x} + \frac{1}{x^2}}{-1 + \frac{4}{x} + \frac{5}{x^2}} = \frac{1 + 0 + 0}{-1 + 0 + 0} = \frac{1}{-1} = \boxed{-1}$

4. (4 points) $\lim_{x \rightarrow 5^+} \frac{x^2 + 2x + 1}{-x^2 + 4x + 5} = \lim_{x \rightarrow 5^+} \frac{(x+1)(x+1)}{(-x-1)(x+5)} = \lim_{x \rightarrow 5^+} \frac{-(x+1)}{x-5}$

Diagram: A number line with points 0, 5, and x. An arrow points from x towards 5 from the right.

$= \lim_{x \rightarrow 5^+} \frac{-x-1}{x-5} = \boxed{-\infty}$
(approaching -6) (approaching 0, positive)

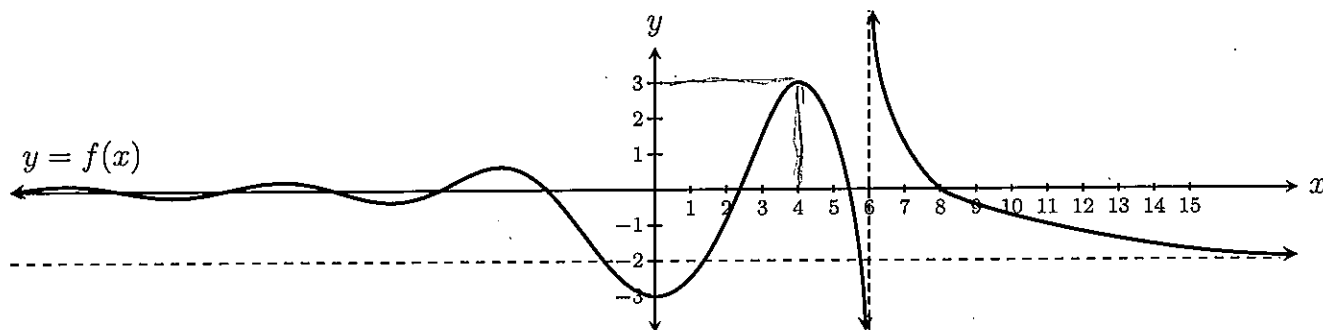
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1. (8 points) Answer the following questions about the function $y = f(x)$ graphed below.



(a) $\lim_{x \rightarrow 6^-} f(x) = \boxed{-\infty}$

(b) $\lim_{x \rightarrow 6^+} f(x) = \boxed{\infty}$

(c) $\lim_{x \rightarrow -\infty} f(x) = \boxed{0}$

(d) $\lim_{x \rightarrow \infty} f(x) = \boxed{-2}$

(e) $\lim_{x \rightarrow 8^-} \frac{1}{f(x)} = \boxed{\infty}$ *approaching 0, pos,*

(f) $\lim_{x \rightarrow 8^+} \frac{1}{f(x)} = \boxed{-\infty}$ *approaching 0, negative*

(g) $\lim_{x \rightarrow 6} \frac{1}{f(x)} = \boxed{0}$

(h) $\lim_{x \rightarrow 4} \frac{1}{f(x) - 3} = \boxed{-\infty}$

2. (4 points) $\lim_{x \rightarrow \infty} \ln\left(\frac{1}{x}\right) = \boxed{-\infty}$ *approaching 0*

approaching 5

3. (4 points) $\lim_{x \rightarrow 3^+} \frac{x^2 + 5x + 6}{x^2 - 9} = \lim_{x \rightarrow 3^+} \frac{(x+2)(x+3)}{(x+3)(x-3)} = \lim_{x \rightarrow 3^+} \frac{x+2}{x-3} = \boxed{\infty}$ *approaching 0, pos,*

4. (4 points) $\lim_{x \rightarrow \infty} \frac{x^2 + 5x + 6}{x^2 - 9} = \lim_{x \rightarrow \infty} \frac{x^2 + 5x + 6}{x^2 - 9} \cdot \frac{\frac{1}{x^2}}{\frac{1}{x^2}} = \lim_{x \rightarrow \infty} \frac{1 + \frac{5}{x} + \frac{6}{x^2}}{1 - \frac{9}{x^2}} = \frac{1+0+0}{1-0} = \boxed{1}$