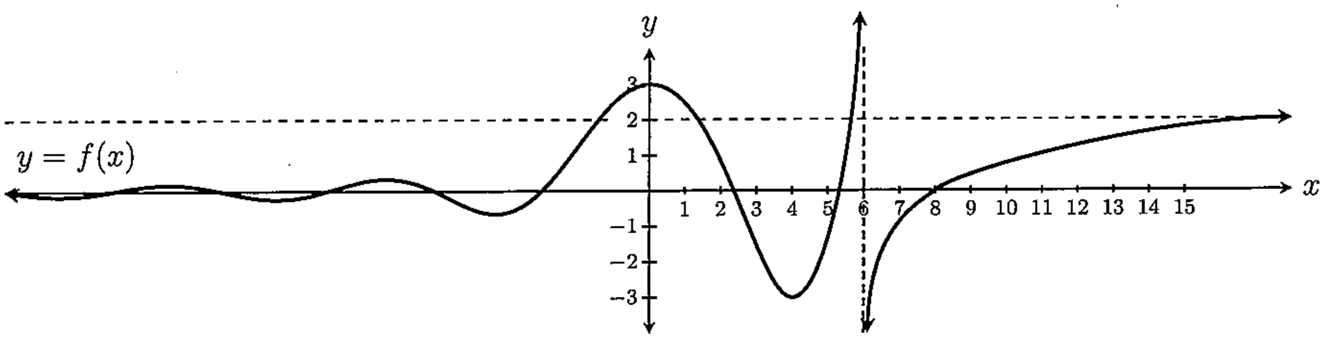
Name: Richard

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) $\lim\limits_{x\to-\infty} f(x) = \boxed{0}$

(b) $\lim\limits_{x\to\infty} f(x) = \boxed{2}$

(c) $\lim\limits_{x\to 6^-} f(x) = \boxed{\infty}$

(d) $\lim\limits_{x\to 6^+} f(x) = \boxed{-\infty}$

(e) $\lim\limits_{x\to 0} \dfrac{1}{f(x)-3} = \boxed{-\infty}$

approaching 0, negative

(f) $\lim\limits_{x\to 6} \dfrac{1}{f(x)} = \boxed{0}$

approaching $\pm\infty$

(g) $\lim\limits_{x\to 8^-} \dfrac{1}{f(x)} = \boxed{-\infty}$

approaching 0, negative

(h) $\lim\limits_{x\to 8^+} \dfrac{1}{f(x)} = \boxed{\infty}$

approaching 0, positive

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

3. (4 points) $\lim\limits_{x\to\infty} \dfrac{x^2+2x+1}{-x^2+4x+5} = \lim\limits_{x\to\infty} \dfrac{x^2+2x+1}{-x^2+4x+5}\cdot\dfrac{\frac{1}{x^2}}{\frac{1}{x^2}}$

$= \lim\limits_{x\to\infty} \dfrac{1+\frac{2}{x}+\frac{1}{x^2}}{-1+\frac{4}{x}+\frac{5}{x^2}} = \dfrac{1+0+0}{-1+0+0} = \dfrac{1}{-1} = \boxed{-1}$

4. (4 points) $\lim\limits_{x\to 5^+} \dfrac{x^2+2x+1}{-x^2+4x+5} = \lim\limits_{x\to 5^+} \dfrac{\overset{(-1)}{\cancel{(x+1)}}(x+1)}{\cancel{(-x-1)}(x-5)} = \lim\limits_{x\to 5^+} \dfrac{-(x+1)}{x-5}$

0 5 ← x

$= \lim\limits_{x\to 5^+} \dfrac{-x-1}{x-5} = \boxed{-\infty}$

approaching −6

approaching 0, positive

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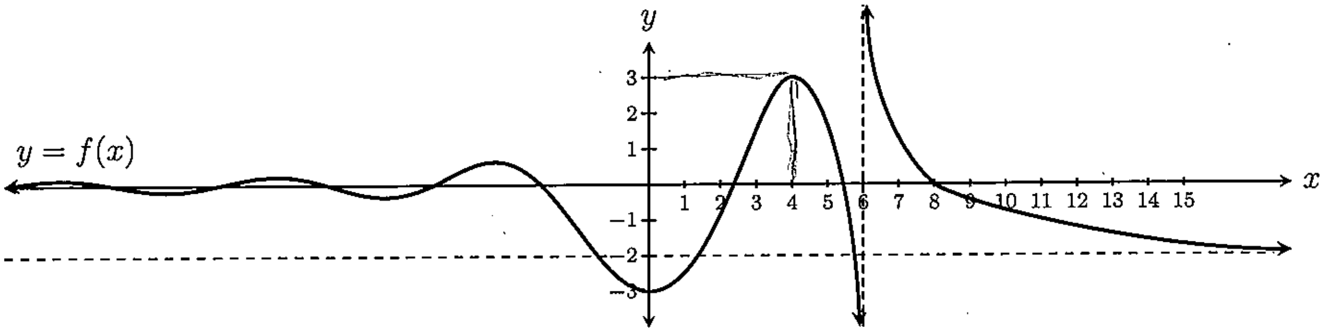

(a) $\lim_{x\to 6^-} f(x) = \boxed{-\infty}$

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

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

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

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

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

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

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

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

approaching 0

3. (4 points) $\lim_{x\to 3^+} \frac{x^2+5x+6}{x^2-9} = \lim_{x\to 3^+} \frac{(x+2)\cancel{(x+3)}}{\cancel{(x+3)}(x-3)} = \lim_{x\to 3^+} \frac{x+2}{x-3} = \boxed{\infty}$

approaching 5

approaching 0, pos.

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

$= \frac{1+0+0}{\ldots} = \boxed{1}$