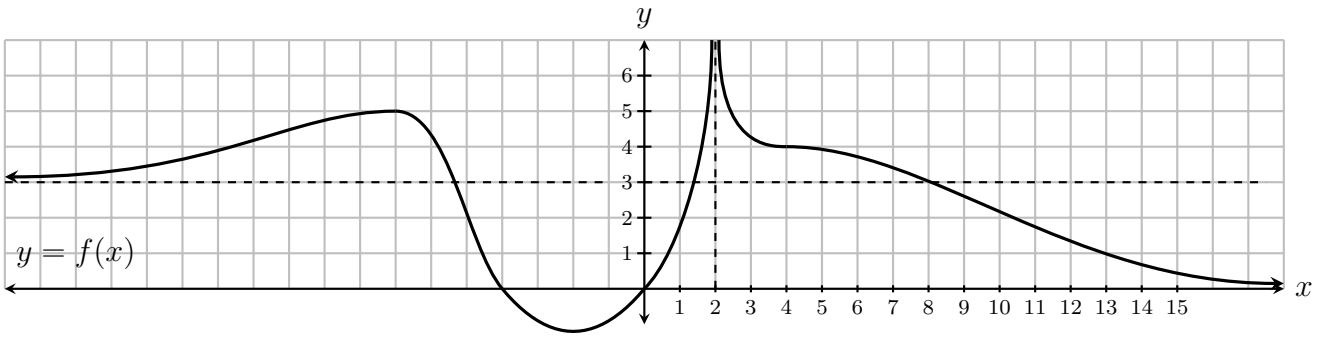
Name: _____

Quiz 4 ♣

MATH 200
September 14, 2022

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



(a) $\lim_{x\to-\infty} f(x) = \boxed{3}$

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

(c) $\lim_{x\to-\infty} \sin\left(\dfrac{\pi}{f(x)}\right) = \sin\left(\frac{\pi}{3}\right) = \boxed{\dfrac{\sqrt{3}}{2}}$

(d) $\lim_{x\to\infty} \dfrac{1}{f(x)} = \boxed{\infty}$ (denominator approaches 0 and is positive)

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

(f) $\lim_{x\to 2} e^{-f(x)} = \lim_{x\to 2} \dfrac{1}{e^{f(x)}} = \boxed{0}$ (denominator approaches ∞)

(g) $\lim_{x\to 0^+} \dfrac{1}{f(x)} = \boxed{\infty}$ (denominator approaches 0 and is positive)

(h) $\lim_{x\to 0^-} \dfrac{1}{f(x)} = \boxed{-\infty}$ (denominator approaches 0 and is negative)

2. (4 points) $\lim_{x\to-\infty} \ln\left(1+\dfrac{1}{x^2}\right) = \ln\left(\lim_{x\to-\infty}\left(1+\dfrac{1}{x^2}\right)\right) = \ln(1+0) = \ln(1) = \boxed{0}$

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

4. (4 points) $\lim_{x\to 2} \dfrac{x^2+2x+1}{(x-2)^2} = \boxed{\infty}$

(Because numerator approaches $2^2 + 2\cdot 2 + 1 = 9$, but denominator approaches 0 and is positive.)