Name: _____

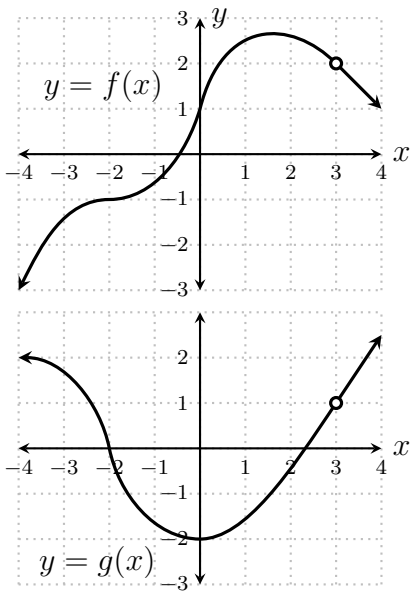
Test 1

MATH 200, Section 3

May 28, 2021

Directions: Closed book, closed notes, no calculators. Put all phones, etc., away. You will need only a pencil or pen.

1. (15 points) Answer the questions about the functions graphed below.



(a) $\lim_{x\to -2} g(x) =$

(b) $\lim_{x\to -2} \dfrac{\sin\big(g(x)\big)}{g(x)} =$

(c) $\lim_{x\to 3} \dfrac{f(x)}{2+g(x)} =$

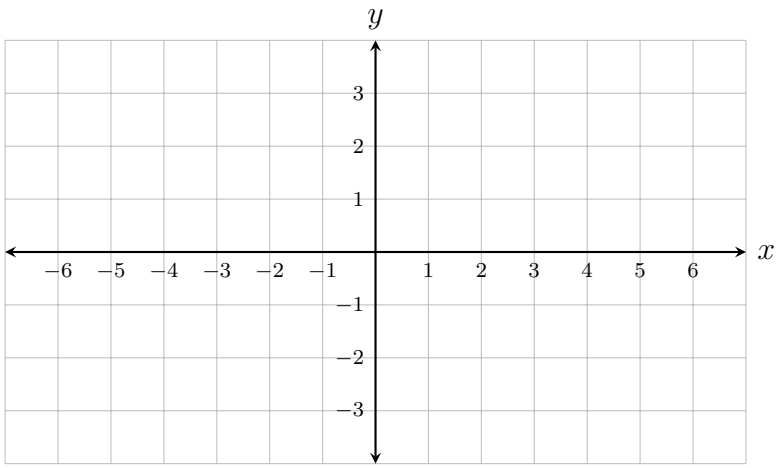
(d) $\lim_{x\to 0} f(x)g(x) =$

(e) $\lim_{x\to 0} f\big(g(x)\big) =$

2. (15 points) Draw the graph of **one** function $f(x)$ meeting **all** of the following conditions.

(a) The domain of f is $(-\infty, 1)\cup(1,\infty)$.

(b) The function f is continuous at all x except $x = -2$, $x = 1$ and $x = 4$.



(c) $\lim_{x\to 1} f(x) = -\infty$

(d) $\lim_{x\to -2} f(x) = 3$

(e) $\lim_{x\to 4^-} f(x) = 2$

(f) $\lim_{x\to 4^+} f(x) = 0$

(g) $\lim_{x\to\infty} f(x) = 1$

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

3. (15 points) Find the limits

(a) $\lim_{x\to \pi/3} \cos(x) =$

(b) $\lim_{x\to \pi/2} \ln\big(\sin(x)\big) =$

(c) $\lim_{x\to -\infty} e^x =$

4. (30 points) Find the limits

(a) $\lim_{x\to\infty} \dfrac{x^2+8x-20}{2x^2+2x-12} =$

(b) $\lim_{x\to 2} \dfrac{x^2+8x-20}{2x^2+2x-12} =$

(c) $\lim_{x\to -3^+} \dfrac{x^2+8x-20}{2x^2+2x-12} =$

(d) $\lim_{x\to 9} \dfrac{\sqrt{x}-3}{x-9} =$

(e) $\lim_{x\to 0} \dfrac{\cos^2(x)-\cos(x)}{\cos(x)-1} =$

5. (10 points) Find the value a such that f is continuous on $(-\infty, \infty)$, where f is defined as

$$f(x) = \begin{cases} 3x - 2 & \text{if } x < 2 \\ 5x + a & \text{if } x \geq 2 \end{cases}$$

6. (15 points) Use a limit to find the slope of the tangent line to $f(x) = \dfrac{6}{x}$ at the point $(6, 1)$.