Name: Richard

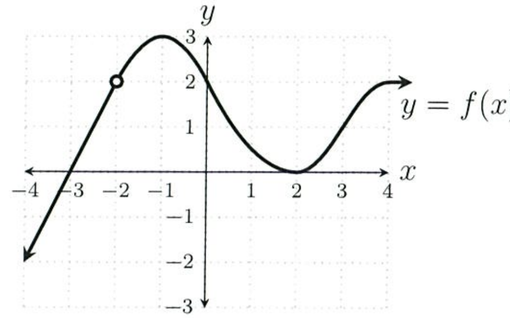
QUIZ 1 ♡

20/20

MATH 200

August 29, 2022

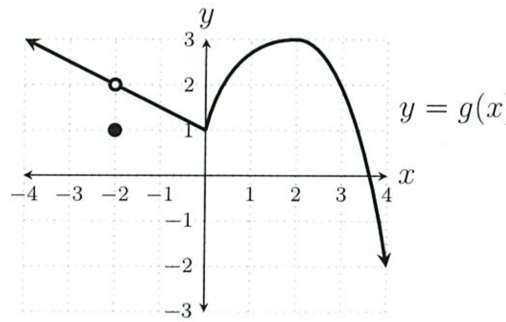
1. Answer the questions about the functions graphed below.



(a) $g(f(0)) = g(2) = \boxed{3}$

(b) $\lim_{x\to 0} f(x) = \boxed{2}$

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



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

$= 1 - 2\cdot 2 = \boxed{-3}$

(e) $\lim_{x\to -2} \sqrt{f(x)+g(x)} = \sqrt{2+2} = \sqrt{4} = \boxed{2}$

2. $\lim_{x\to 3} \dfrac{2^x}{x^2-5} = \dfrac{\lim_{x\to 3} 2^x}{\lim_{x\to 3}(x^2-5)} = \dfrac{2^3}{3^2-5} = \dfrac{8}{9-5} = \dfrac{8}{4} = \boxed{2}$

3. $\lim_{x\to 4} \left(\dfrac{5}{2x} - \dfrac{1}{2}\right)^{1/3} = \left(\lim_{x\to 4}\left(\dfrac{5}{2x} - \dfrac{1}{2}\right)\right)^{1/3} = \left(\dfrac{5}{2\cdot 4} - \dfrac{1}{2}\right)^{1/3}$

$= \left(\dfrac{5}{8} - \dfrac{1}{2}\right)^{1/3} = \left(\dfrac{5}{8} - \dfrac{4}{8}\right)^{1/3} = \left(\dfrac{1}{8}\right)^{1/3} = \boxed{\dfrac{1}{2}}$

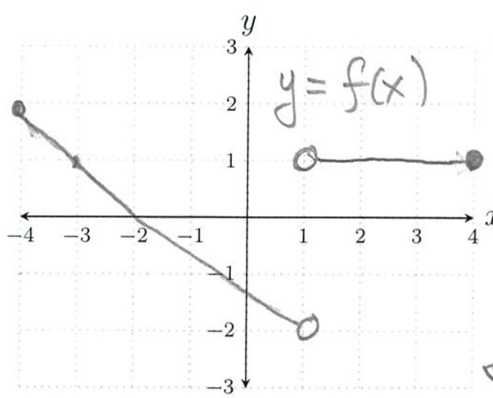
4. Draw the graph of **one** function f, with domain $[-4, 1) \cup (1, 4]$, meeting the following conditions.

(a) $\lim_{x\to 1^-} f(x) = -2$

(b) $\lim_{x\to 1} f(x)$ DNE

(c) $\lim_{x\to -2} f(x) = 0$

(d) $f(-3) = f(3)$



Here is one of many correct answers

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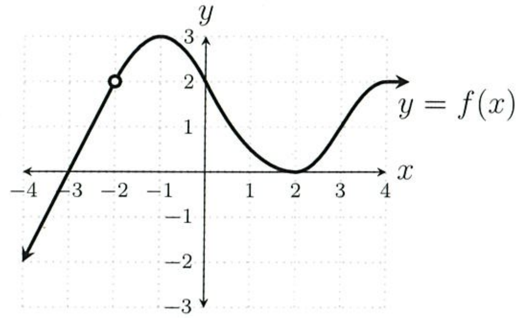
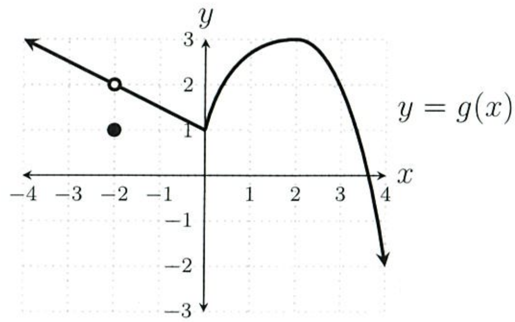




(a) $f(g(3)) = f(2) = \boxed{0}$

(b) $\lim_{x\to 3} f(x) = \boxed{1}$

(c) $\lim_{x\to -2} 2f(x) = 2\cdot \lim_{x\to -2} f(x) = 2\cdot 2 = \boxed{4}$

(d) $\lim_{x\to 3} \left(f(x)+g(x)\right) = \lim_{x\to 3} f(x) + \lim_{x\to 3} g(x) = 1 + 2 = \boxed{3}$

(e) $\lim_{x\to -2} \left(\frac{1}{f(x)} + \frac{1}{g(x)}\right) = \frac{1}{2} + \frac{1}{2} = \boxed{1}$

2. $\lim_{x\to 3} \frac{3^x+3}{x^2+1} = \frac{\lim_{x\to 3}(3^x+3)}{\lim_{x\to 3}(x^2+1)} = \frac{3^3+3}{3^2+1} = \frac{27+3}{9+1} = \frac{30}{10} = \boxed{3}$

3. $\lim_{x\to 8} \left(\frac{14}{x}+\frac{1}{2}\right)^{1/2} = \left(\lim_{x\to 8}\left(\frac{14}{x}+\frac{1}{2}\right)\right)^{1/2} = \left(\frac{14}{8}+\frac{1}{2}\right)^{1/2} = \left(\frac{14}{8}+\frac{4}{8}\right)^{1/2}$

$= \left(\frac{18}{8}\right)^{1/2} = \sqrt{\frac{9}{4}} = \boxed{3/2}$

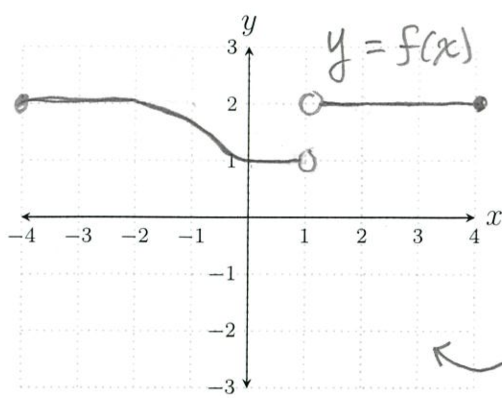
4. Draw the graph of **one** function f, with domain $[-4,1)\cup(1,4]$, meeting the following conditions.

(a) $\lim_{x\to 1^+} f(x) = 2$

(b) $\lim_{x\to 1} f(x)$ DNE

(c) $\lim_{x\to 0} f(x) = 1$

(d) $f(-2) = f(2)$



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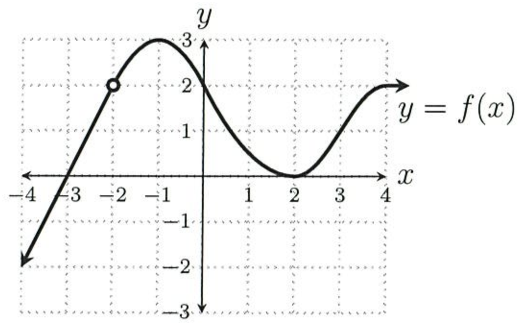
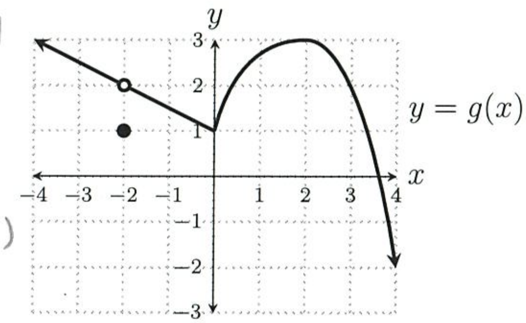
1. Answer the questions about the functions graphed below.



(a) $g(f(-1)) = g(3) = \boxed{2}$

(b) $\lim_{x\to 2} g(x) = \boxed{3}$

(c) $\lim_{x\to -2} 3g(x) = 3 \lim_{x\to -2} g(x) = 3\cdot 2 = \boxed{6}$



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

$= 1 - 2 = \boxed{-1}$

(e) $\lim_{x\to -2} \left(\frac{5}{f(x)} + \frac{3}{g(x)}\right) = \lim_{x\to -2} \frac{5}{f(x)} + \lim_{x\to -2} \frac{3}{g(x)}$

$= \frac{5}{2} + \frac{3}{2} = \frac{8}{2} = \boxed{4}$

2. $\lim_{x\to 4} \frac{2^x - 1}{\sqrt{x}+1} = \frac{\lim_{x\to 4}(2^x - 1)}{\lim_{x\to 4}(\sqrt{x}+1)} = \frac{2^4 - 1}{\sqrt{4}+1} = \frac{16-1}{2+1} = \frac{15}{3} = \boxed{5}$

3. $\lim_{x\to 4} \left(\frac{5}{2x} - \frac{1}{2}\right)^{2/3} = \left(\lim_{x\to 4}\left(\frac{5}{2x} - \frac{1}{2}\right)\right)^{2/3} = \left(\frac{5}{2\cdot 4} - \frac{1}{2}\right)^{2/3} = \left(\frac{5}{8} - \frac{1}{2}\right)^{2/3}$

$= \left(\frac{5}{8} - \frac{4}{8}\right)^{2/3} = \left(\frac{1}{8}\right)^{2/3} = \sqrt[3]{\frac{1}{8}}^{\,2} = \left(\frac{1}{2}\right)^2 = \boxed{\frac{1}{4}}$

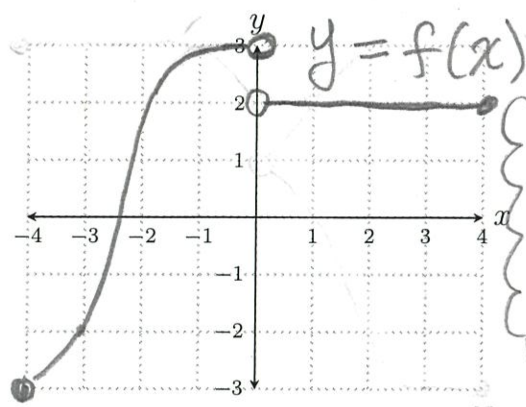
4. Draw the graph of **one** function f, with domain $[-4, 0) \cup (0, 4]$, meeting the following conditions.

(a) $\lim_{x\to 0} f(x)$ DNE

(b) $\lim_{x\to 0^+} f(x) = 2$

(c) $\lim_{x\to -1} f(x) = 3$

(d) $f(-3) = -f(3)$



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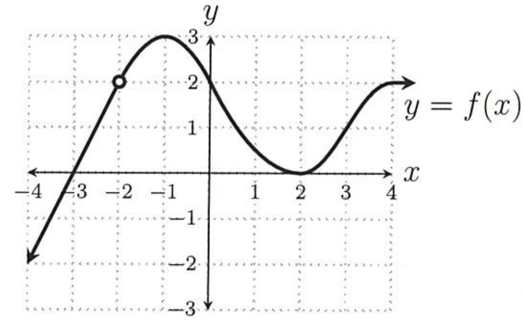


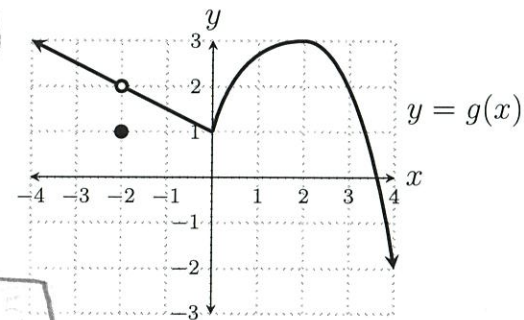
(a) $g(f(2)) = g(0) = \boxed{1}$ ✓

(b) $\lim\limits_{x \to 2} f(x) = \boxed{0}$ ✓

(c) $\lim\limits_{x \to 2} 4g(x) = 4 \cdot \lim\limits_{x \to 2} g(x) = 4 \cdot 3 = \boxed{12}$

(d) $\lim\limits_{x \to 3} \left(2f(x) - g(x)\right) = 2 \lim\limits_{x \to 3} f(x) - \lim\limits_{x \to 3} g(x)$

$= 2 \cdot 1 - 2 = \boxed{0}$



(e) $\lim\limits_{x \to -2} \dfrac{3 + f(x)}{\sqrt{7 + g(x)}} =$

$= \dfrac{\lim\limits_{x \to -2} (3 + f(x))}{\lim\limits_{x \to -2} \sqrt{7 + g(x)}} = \dfrac{3+2}{\sqrt{7+2}} = \dfrac{5}{\sqrt{9}} = \boxed{\dfrac{5}{3}}$

2. $\lim\limits_{x \to -1} \dfrac{3^x}{x^2 + 1} = \dfrac{\lim\limits_{x \to -1} 3^x}{\lim\limits_{x \to -1} (x^2+1)} = \dfrac{3^{-1}}{(-1)^2+1} = \dfrac{3^{-1}}{2} = \dfrac{1}{3 \cdot 2} = \boxed{\dfrac{1}{6}}$

3. $\lim\limits_{x \to 2} \left(\dfrac{5}{2x^2} - \dfrac{1}{2}\right)^{2/3} = \left(\lim\limits_{x \to 2} \left(\dfrac{5}{2x^2} - \dfrac{1}{2}\right)\right)^{2/3} = \left(\dfrac{5}{2 \cdot 2^2} - \dfrac{1}{2}\right)^{2/3}$

$= \sqrt[3]{\dfrac{5}{8} - \dfrac{1}{2}}^{\,2} = \sqrt[3]{\dfrac{5}{8} - \dfrac{4}{8}}^{\,2} = \sqrt[3]{\dfrac{1}{8}}^{\,2} = \left(\dfrac{1}{2}\right)^2 = \boxed{\dfrac{1}{4}}$

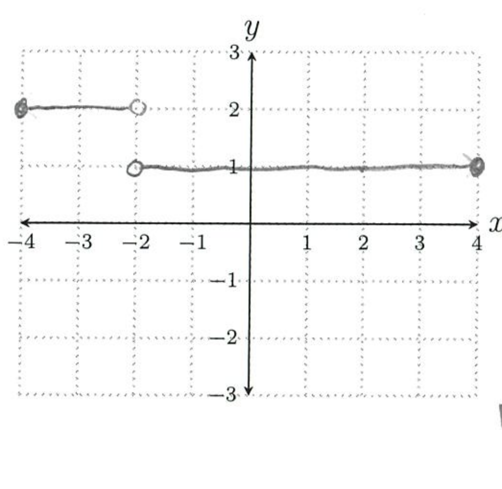
4. Draw the graph of **one** function f, with domain $[-4, -2) \cup (-2, 4]$, meeting the following conditions.

(a) $\lim\limits_{x \to -2^-} f(x) = 2$

(b) $\lim\limits_{x \to -2} f(x)$ DNE

(c) $\lim\limits_{x \to 2} f(x) = 1$

(d) $f(0) = f(2)$



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