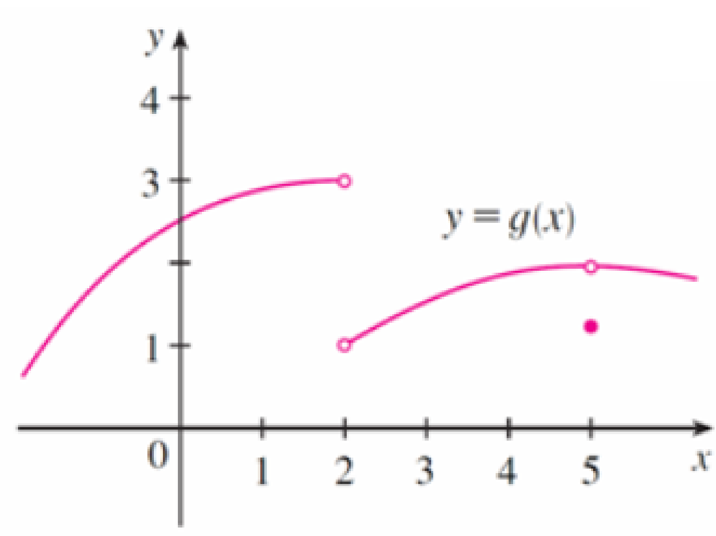
Use the graph shown below to evaluate the following limits:



Notice... $g(5) = 1.2$

closed dot
(defined height)

1. $\lim_{x \to 2^-} g(x) = \boxed{3}$

"as x approaches 2 from the left"

2. $\lim_{x \to 2^+} g(x) = \boxed{1}$

"as x approaches 2 from the right"

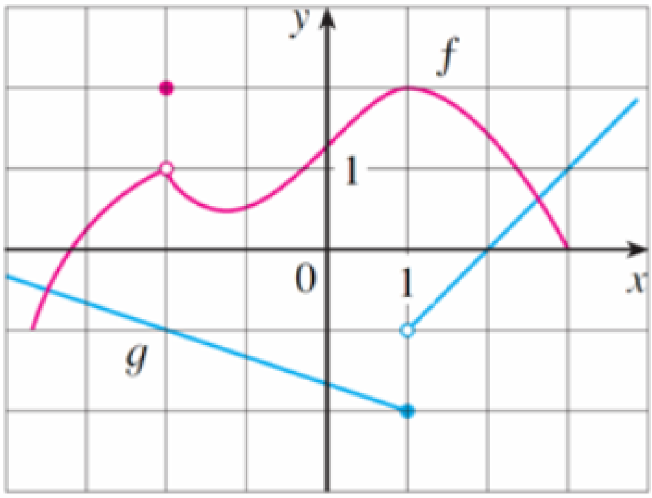
3. $\lim_{x \to 2} g(x) = \boxed{\text{DNE}}$

4. $\lim_{x \to 5^-} g(x) = \boxed{2}$

5. $\lim_{x \to 5^+} g(x) = \boxed{2}$

6. $\lim_{x \to 5} g(x) = \boxed{2}$

Example:



$f(-2) = 2$

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

$g(1) = -2$

$\lim_{x \to 1^+} g(x) = -1$

$\lim_{x \to 1} g(x) = \text{DNE}$

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

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

Calculate the following limits!

$$\lim_{x\to\infty}\frac{(2-3x^2)^2}{(2x^2+1)(3x^2-5)}$$

$$\lim_{x\to\infty}\frac{4-12x^2+9x^4}{6x^4-7x^2-5}$$

$$\lim_{x\to\infty}\frac{\frac{4}{x^4}-\frac{12x^2}{x^4}+\frac{9x^4}{x^4}}{\frac{6x^4}{x^4}-\frac{7x^2}{x^4}-\frac{5}{x^4}}$$

$$\lim_{x\to\infty}\frac{\frac{4}{x^4}-\frac{12}{x^2}+9}{6-\frac{7}{x^2}-\frac{5}{x^4}}$$

$$\lim_{x\to\infty}\frac{0-0+9}{6-0-0}=\frac{9}{6}=\frac{3}{2}$$

$$\lim_{x\to 2}\frac{\sqrt{x}-\sqrt{2}}{x^4-16}$$

$$\lim_{x\to 2}\frac{\sqrt{x}-\sqrt{2}}{(x^2-4)(x^2+4)}$$

$$\lim_{x\to 2}\frac{(\sqrt{x}-\sqrt{2})(\sqrt{x}+\sqrt{2})}{(x-2)(x+2)(x^2+4)(\sqrt{x}+\sqrt{2})}$$

$$\lim_{x\to 2}\frac{\cancel{(x-2)}}{\cancel{(x-2)}\underbrace{(x+2)}_{(4)}\underbrace{(x^2+4)}_{(8)}\underbrace{(\sqrt{x}+\sqrt{2})}_{(2\sqrt{2})}}=\frac{1}{64\sqrt{2}}\quad\text{or}\quad\frac{\sqrt{2}}{128}$$

$$\lim_{x\to 0}\frac{x^2+3x}{(x+2)^2-(x-2)^2}$$

$$\lim_{x\to 0}\frac{x(x+3)}{\underbrace{[(x+2)-(x-2)]}_{x+2-x+2}\underbrace{[(x+2)+(x-2)]}_{x+2+x-2}}$$

$$\lim_{x\to 0}\frac{x(x+3)}{(4)(2x)}$$

$$\lim_{x\to 0}\frac{\cancel{x}(x+3)}{8\cancel{x}}=\frac{3}{8}$$

$$\lim_{a\to b}\frac{(a+2b)^2-9b^2}{a-b}$$

$$\lim_{a\to b}\frac{\overbrace{[(a+2b)-3b]}^{a+2b-3b}\overbrace{[(a+2b)+3b]}^{a+2b+3b}}{a-b}$$

$$\lim_{a\to b}\frac{\cancel{(a-b)}(a+5b)}{\cancel{a-b}}=6b$$

Given the function

$$f(x)=\begin{cases} 3-x, & \text{if } x<-1 \\ 4, & \text{if } -1\le x<2 \\ 1, & \text{if } x=2 \\ 8-x^2, & \text{if } x>2 \end{cases}$$

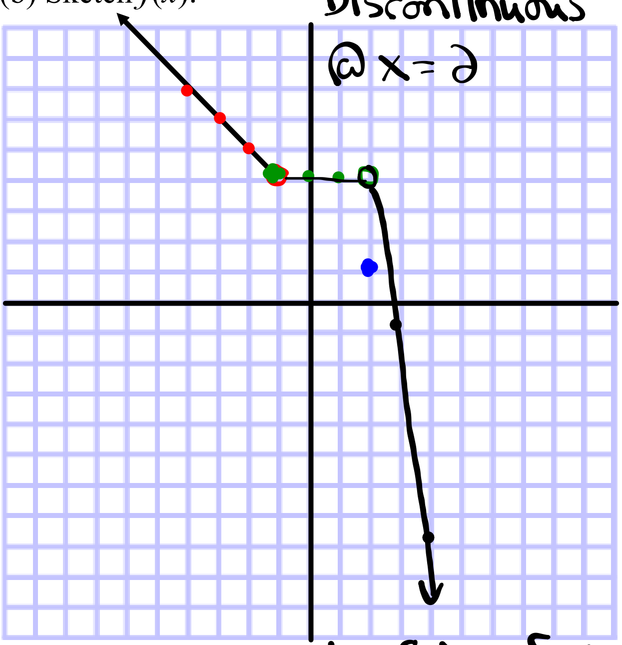
$>, <$ (open)

$\geq, \leq, =$ (closed)

(a) Check $f(x)$ for any points of discontinuity. Provide a mathematical reason to validate any point(s) where the function is discontinuous.

(b) Sketch $f(x)$.

Discontinuous @ $x=2$



$$\lim_{x\to 2} f(x) \neq f(2)$$

$$4 \neq 1$$

$3-x$

	x	$f(x)$
o	−1	4
•	−2	5
•	−3	6
•	−4	7

4

	x	$f(x)$
•	−1	4
•	0	4
•	1	4
o	2	4

1

	x	$f(x)$
•	2	1

$8-x^2$

	x	$f(x)$
o	2	4
•	3	−1
•	4	−8