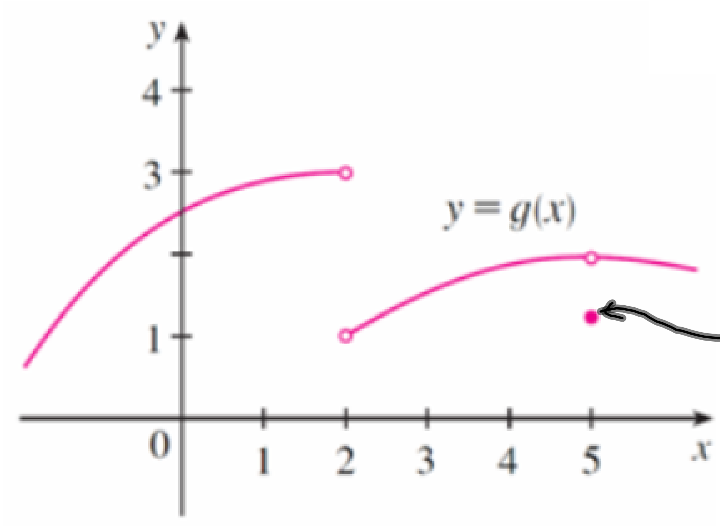
Use the graph shown below to evaluate the following limits:



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

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"

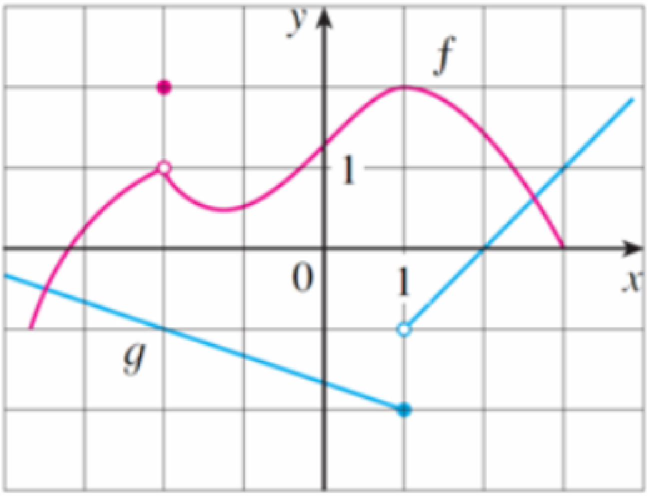
3. $\lim_{x \to 2} g(x) = \boxed{\text{DNE}}$

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!

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

$$\lim_{x\to\infty}\frac{4-12x^2+9x^4}{6x^4-7x^2-5}=\frac{9}{6}=\boxed{\frac{3}{2}}$$

$\frac{0}{0}$ (Indeterminate Form)

$$\lim_{x\to 2}\frac{\left(\sqrt{x}-\sqrt{2}\right)\left(\sqrt{x}+\sqrt{2}\right)}{\left(x^4-16\right)\left(\sqrt{x}+\sqrt{2}\right)}$$

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

$$\lim_{x\to 2}\frac{\cancel{(x-2)}}{\cancel{(x-2)}(x+2)(x^2+4)(\sqrt{x}+\sqrt{2})}=\frac{1}{(4)(8)(2\sqrt{2})}=\frac{1}{64\sqrt{2}}=\boxed{\frac{\sqrt{2}}{128}}$$

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

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

$$\lim_{x\to 0}\frac{\cancel{x}(x+3)}{4(2\cancel{x})}=\boxed{\frac{3}{8}}$$

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

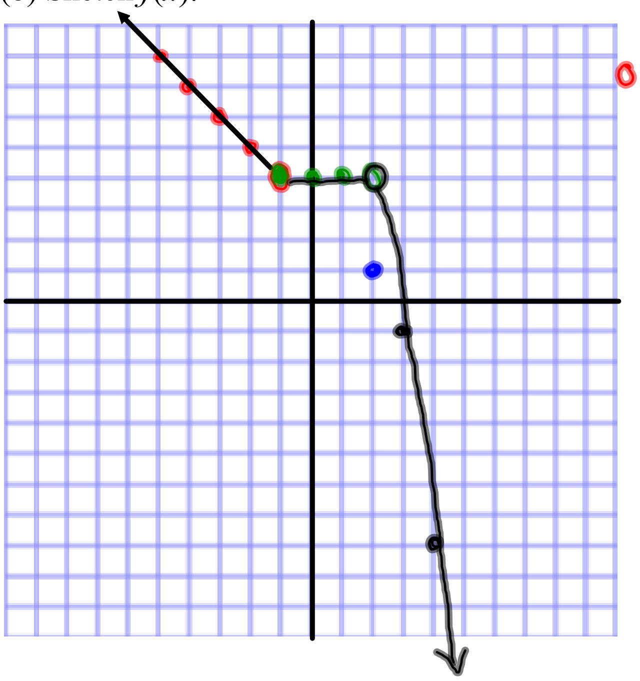
$$\lim_{a\to b}\frac{(a+2b-3b)(a+2b+3b)}{a-b}$$

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

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

(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 $f(x)$.



$3-x$

x	$f(x)$
-1	4
-2	5
-3	6

4

x	$f(x)$
-1	4
0	4
1	4
2	4

1

x	$f(x)$
2	1

$8-x^2$

x	$f(x)$
2	4
3	-1
4	-8

Discontinuous at $x=2$

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

$$1 \neq 4$$