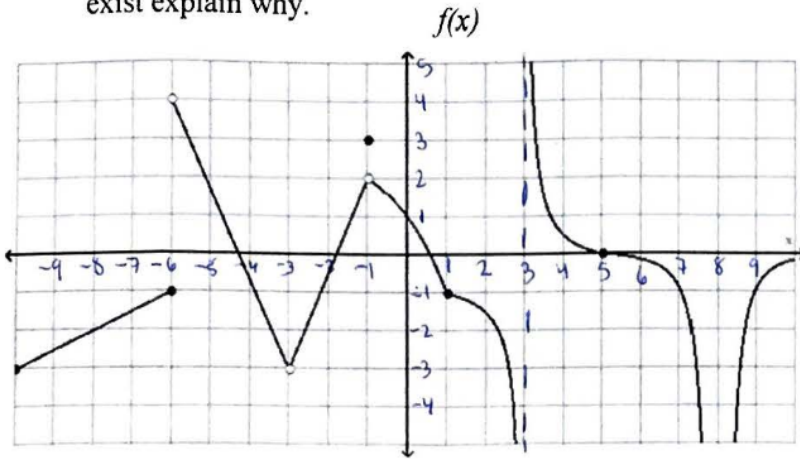


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## Review Chapter 12 Limits Part 1

1. Refer to the graph of  $f(x)$  shown below in order to answer the following questions. If a limit does not exist explain why.



a.  $\lim_{x \rightarrow 6} f(x) = \text{DNE}$

b.  $\lim_{x \rightarrow 3} f(x) = \text{DNE}$

c.  $\lim_{x \rightarrow 1} f(x) = -1$

d.  $f(-3) = \text{undefined}$

e.  $\lim_{x \rightarrow 3^+} f(x) = -\infty$

f.  $f(-1) = 3$

g.  $\lim_{x \rightarrow 6^+} f(x) = 4$

h.  $\lim_{x \rightarrow 6^-} f(x) = -1$

2. Evaluate the following limits.

a.  $\lim_{x \rightarrow -3} \frac{6x-4}{2x-1} = \frac{6(-3)-4}{2(-3)-1} = \frac{-18-4}{-6-1} = \frac{-22}{-7} = \boxed{\frac{22}{7}}$

d.  $\lim_{x \rightarrow 1} (2x+3) = 2(1)+3 = 2+3 = \boxed{5}$

b.  $\lim_{x \rightarrow 5} \frac{x+1}{x+2} = \frac{5+1}{5+2} = \boxed{\frac{6}{7}}$

e.  $\lim_{x \rightarrow 9} x = \boxed{9}$

c.  $\lim_{x \rightarrow 5} (3(x-1))$   
 $(3(5-1))$   
 $3(4)$   
 $\boxed{12}$

f.  $\lim_{x \rightarrow \pi} (\cos x \sin x)$   
 $\cos \pi \sin \pi$   
 $(-1)(0)$   
 $= \boxed{0}$

3. Use a graphing utility to graph the function and use the graph to determine whether the specified limits exist or the value of the function.

$$f(x) = \begin{cases} 9 - 2x, & x \leq 1 \\ 5x^2 + 2, & x > 1 \end{cases}$$

a.  $\lim_{x \rightarrow 1^+} f(x) = 5(1)^2 + 2$   
 $= 5 + 2$   
 $= \boxed{7}$

c.  $\lim_{x \rightarrow 2} f(x) = 5(2)^2 + 2$   
 $= 5(4) + 2$   
 $= \boxed{22}$

e.  $f(1) = 9 - 2(1)$   
 $= 9 - 2$   
 $= \boxed{7}$

b.  $\lim_{x \rightarrow 1^-} f(x) = 9 - 2(1)$   
 $= 9 - 2$   
 $= \boxed{7}$

d.  $\lim_{x \rightarrow 1} f(x) = 7$

f.  $f(0) = 9 - 2(0)$   
 $= \boxed{9}$

Find the limits, if it exists. If it does not exist, explain why not.

4.  $\lim_{x \rightarrow 3} f(x)$ , where  $f(x) = \begin{cases} \frac{x+2}{2}, & x \leq 3 \\ \frac{12-2x}{3}, & x > 3 \end{cases}$

$\lim_{x \rightarrow 3^-} \frac{3+2}{2} = \boxed{\frac{5}{2}}$   
 $\lim_{x \rightarrow 3^+} \frac{12-2(3)}{3} = \boxed{3}$

$\lim_{x \rightarrow 3}$  DNE, b/c  
 Left/right hand  
 limits have different  
 values.

5.  $\lim_{x \rightarrow 2} f(x)$ , where  $f(x) = \begin{cases} x^2 - 4x + 6, & x < 2 \\ -x^2 + 4x - 2, & x \geq 2 \end{cases}$

$\lim_{x \rightarrow 2^-} (2)^2 - 4(2) + 6 = 2$   
 $\lim_{x \rightarrow 2^+} -(2)^2 + 4(2) - 2 = 2$   
 $= \boxed{2}$

6.  $\lim_{x \rightarrow 1} f(x)$ , where  $f(x) = \begin{cases} x^3 + 1, & x < 1 \\ x + 1, & x > 1 \end{cases}$

$\lim_{x \rightarrow 1^-} (1)^3 + 1 = 2$

$\lim_{x \rightarrow 1^+} 1 + 1 = 2$

$\lim_{x \rightarrow 1} = \boxed{2}$

7.  $\lim_{x \rightarrow 3} f(x)$ , where  $f(x) = \begin{cases} x, & x \leq 1 \\ 1 - x, & x > 1 \end{cases}$

$\lim_{x \rightarrow 3^-} = \boxed{3}$

$\lim_{x \rightarrow 3^+} = 1 - 3 = -2$

$\lim_{x \rightarrow 3}$  DNE, b/c the right/left  
 had limits have different  
 values.