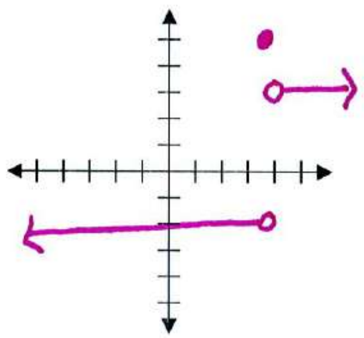
AP Calculus : Limits and Continuity Name ______________________

Day 3 **One Sided Limits** Date ______________ Period _____

Draw a sketch. Find the indicated limit if it exists. If the limit does not exist, explain why.

1. $G(x)=\begin{cases}3, & \text{if } x>4\\ 5, & \text{if } x=4\\ -2, & \text{if } x<4\end{cases}$



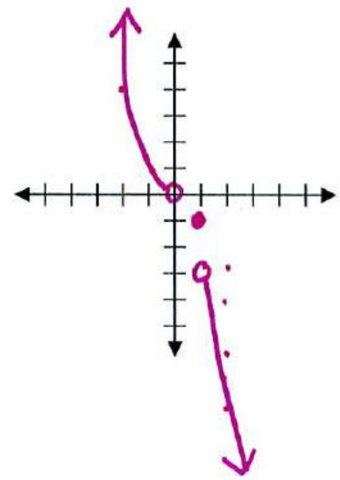
a. $\lim_{x\to 4^+} G(x)$ $=3$

b. $\lim_{x\to 4^-} G(x)$ $=-2$

c. $\lim_{x\to 4} G(x)$ $=$ dne

d. $G(4)$ $=5$

2. $T(x)=\begin{cases}3-6x, & \text{if } x>1\\ -1, & \text{if } x=1\\ x^2, & \text{if } x<1\end{cases}$



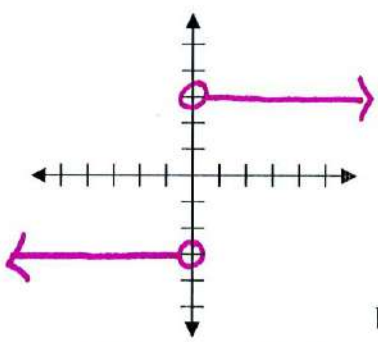
a. $\lim_{x\to 1^-} T(x)=0$

b. $\lim_{x\to 1^+} T(x)=-3$

c. $\lim_{x\to 1} T(x)=$ dne

d. $T(1)=-1$

3. $G(x)=\dfrac{|3x|}{x}$



a. $\lim_{x\to 0^+} G(x)=3$

b. $\lim_{x\to 0^-} G(x)=-3$

c. $\lim_{x\to 0} G(x)=$ dne

d. $G(0)=$ undefined

0	$\frac{\lvert 3x\rvert}{x}$
.01	3
.1	3
1	3
2	3
3	3
4	3

0	$\frac{\lvert 3x\rvert}{x}$
-.01	-3
-.1	-3
-1	-3
-2	-3
-3	-3
-4	-3

4. Find the limit without sketching the graph

$F(x)=\begin{cases}x^2-16, & \text{if } x<3\\ 5, & \text{if } x=3\\ 14-x^2, & \text{if } x>3\end{cases}$

Less than 3
2.99999 is less than 3
$(2.99999)^2-16$
$=7.00006$
from Left

greater than 3
3.0001
$14-(3.0001)^2$
$=4.9993999$
from Right

a. $\lim_{x\to 3^+} F(x)=5$

b. $\lim_{x\to 3^-} F(x)=7$

c. $\lim_{x\to 3} F(x)$ $=$ dne

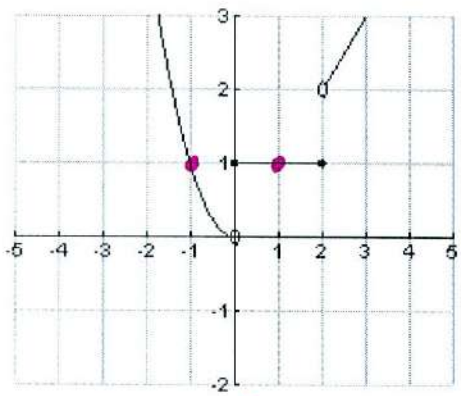
d. $F(3)$ $=5$

AP Calculus : Limits and Continuity Name ____________________

Day 3 **One Sided Limits** Date ______________ Period ______

Find the indicated limits.

5.



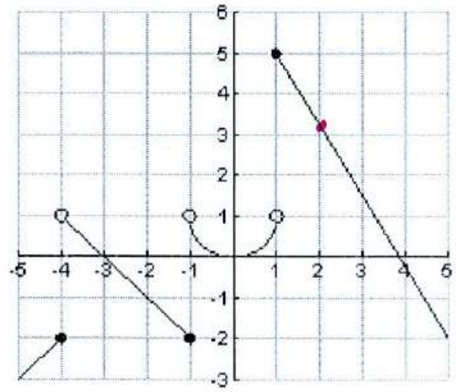
$\lim_{x\to 0^+} = 1$ $\lim_{x\to 2^+} = 2$ $f(0) = 1$

$\lim_{x\to 0^-} = 0$ $\lim_{x\to 2^-} = 1$ $f(2) = 1$

$\lim_{x\to 0} =$ dne $\lim_{x\to 2} =$ dne $\lim_{x\to -1} = 1$

$\lim_{x\to 1} = 1$

6.

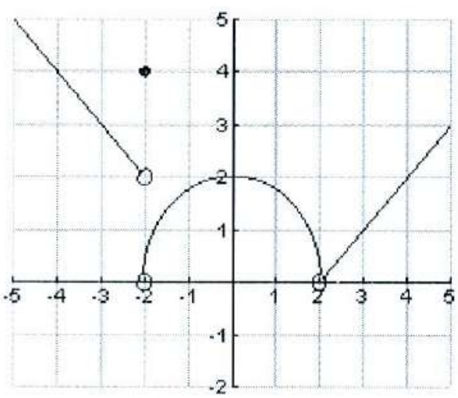


$\lim_{x\to -4^+} = 1$ $\lim_{x\to 1} =$ dne $f(-2) = -1$

$\lim_{x\to -4^-} = -2$ $\lim_{x\to -1} =$ dne $f(-1) = -2$

$\lim_{x\to -4} =$ dne $\lim_{x\to 2} = 3.25$ $\lim_{x\to -1} =$ dne

7.

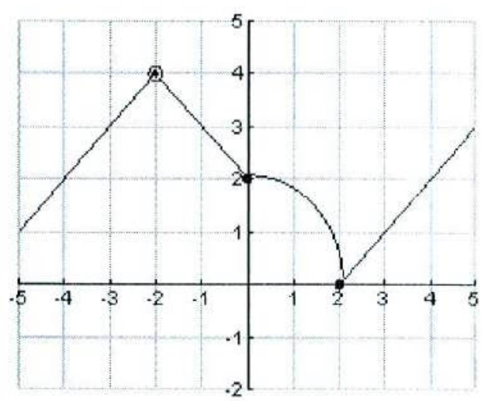


$\lim_{x\to -2^+} = 0$ $\lim_{x\to 0^+} = 2$ $\lim_{x\to 2^+} = 0$

$\lim_{x\to -2^-} = 2$ $\lim_{x\to 0^-} = 2$ $\lim_{x\to 2^-} = 0$

$\lim_{x\to -2} =$ dne $\lim_{x\to 0} = 2$ $\lim_{x\to 2} = 0$

8.



$\lim_{x\to -2^+} = 4$ $\lim_{x\to 2^+} = 0$ $\lim_{x\to 0} = 2$

$\lim_{x\to -2^-} = 4$ $\lim_{x\to 2^-} = 0$ $\lim_{x\to 4} = 2$

$\lim_{x\to -2} = 4$ $\lim_{x\to 2} = 0$ $\lim_{x\to -4} = 2$

Honors Calculus
Finding Limit Numerically

Name Key

Find the Limit of each by making a table.
Make sure your tables go from smallest to biggest!!!!

1. $\lim_{x\to 5}\frac{x^2-3x-10}{x-5}$

Approaching -2 from left. → 5 ← Approaching 5 from right.

x	4.9	4.99	4.999	5.001	5.01	5.1
$f(x)$	6.9	6.99	6.999	7.001	7.01	7.1

$= \boxed{7}$

2. $\lim_{x\to -2}\frac{2x^2+5x+2}{x+2}$

Approaching -2 from left. → -2 ← Approaching -2 from right.

x	-2.1	-2.01	-2.001	-1.999	-1.99	-1.9
$f(x)$	-3.2	-3.02	-3.002	-2.998	-2.98	-2.8

$= \boxed{-3}$

3. $\lim_{x\to 0}\frac{\sqrt{x+3}-\sqrt{3}}{x}$

0

x	-.1	-.01	-.001	.001	.01	.1
$f(x)$	.29112	.28892	.2887	.28865	.28843	.28631

$\boxed{= .2887}$

4. $\lim_{x\to 3}\frac{\frac{\cancel{x}1}{x+1}-\frac{1}{4}}{x-3}$

3

x	2.9	2.99	2.999	3.001	3.01	3.1
$f(x)$	-.0641	-.0627	-.0625	-.0625	-.0623	-.061

$\boxed{= -.0625}$

Mode = radian

5. $\lim_{x\to 0}\frac{\sin x}{x}$

0

x	-.1	-.01	-.001	.001	.01	.1
$f(x)$	.99833	.99998	1	1	.99998	.99833

$\boxed{= 1}$

6. $\lim_{x\to 2}\frac{x-2}{x^2-4}$

2

x	1.9	1.99	1.999	2.001	2.01	2.1
$f(x)$	.25641	.25063	.25006	.24994	.24938	.2439

$\boxed{= .25 = \frac{1}{4}}$