Name Answer key **Date**_____

Calc I H –1.2-1.3 Review **Period**_____

1. Find the value of the limit $\lim_{x\to -1}\frac{x^2+2x+1}{x^2-x-2}$. $= \lim_{x\to -1}\frac{(x+1)^2}{(x-2)(x+1)} = \lim_{x\to -1}\frac{x+1}{x-2} = 0$

A)	1	B)	2	C)	-2	D)	0
E)	-1	F)	$\frac{1}{2}$	G)	$-\frac{1}{2}$	H)	does not exist

2. Find the value of the limit $\lim_{x\to 1}\frac{x-1}{x^4-1}$. $= \lim_{x\to 1}\frac{x-1}{(x+1)(x-1)(x^2+1)} = \lim_{x\to 1}\frac{1}{(x+1)(x^2+1)} = \frac{1}{2\cdot 2} = \frac{1}{4}$

A)	0	B)	2	C)	4	D)	8
E)	$\frac{1}{4}$	F)	$\frac{1}{8}$	G)	$\frac{1}{32}$	H)	$\frac{1}{64}$

3. Suppose that $\lim_{x\to c} f(x) = -9$ and $\lim_{x\to c} g(x) = 14$. Find $\lim_{x\to c}[f(x)-g(x)]$. $= \lim_{x\to c} f(x) - \lim_{x\to c} g(x)$ $= -9 - 14$ $= -23$

A)	-9	B)	14	C)	-23	D)	23
E)	-5	F)	5	G)	-14	H)	does not exist

4. Find the value of the limit $\lim_{x\to 4}\frac{x-4}{\sqrt{x}-2}$. $\cdot\frac{\sqrt{x}+2}{\sqrt{x}+2} = \lim_{x\to 4}\frac{(x-4)(\sqrt{x}+2)}{x-4} = \lim_{x\to 4}(\sqrt{x}+2) = \sqrt{4}+2 = 4$

A)	0	B)	2	C)	4	D)	8
E)	$\frac{1}{4}$	F)	$\frac{1}{8}$	G)	$\frac{1}{32}$	H)	$\frac{1}{64}$

5. Find the value of the limit $\lim_{x\to 2}\frac{x^2+x-6}{x^2-5x+6}$. $= \lim_{x\to 2}\frac{(x+3)(x-2)}{(x-3)(x-2)} = \lim_{x\to 2}\frac{x+3}{x-3} = \frac{2+3}{2-3} = -5$

A)	-5	B)	-3	C)	-1	D)	0
E)	1	F)	3	G)	5	H)	6

6. Write the **2** special trig limits from Section 1.3:

$\lim_{x\to 0}\frac{\sin x}{x} = 1$ $\lim_{x\to 0}\frac{1-\cos x}{x} = 0$

7. **Find the following limits <u>algebraically</u>. Show your work.**

a. $\lim_{x\to 0}\frac{10-10\cos(3x)}{4x} = \lim_{x\to 0}\frac{10}{4}\cdot\frac{(1-\cos(3x))}{x}\cdot\frac{3}{3}$

$= \lim_{x\to 0}\left[\frac{30}{4}\cdot\frac{1-\cos(3x)}{3x}\right]$

$= \frac{30}{4}\cdot 0 = \boxed{0}$

b. $\lim_{x\to 0}\frac{(3x)^2+1}{1-\sin(x)} = \frac{0^2+1}{1-\sin 0} = \frac{1}{1} = \boxed{1}$

"$\frac{0}{0}$" c. $\lim_{x\to 0}\frac{\tan(7x)}{x} = \lim_{x\to 0}\frac{\sin(7x)}{\cos(7x)}\cdot\frac{1}{x}$

$= \lim_{x\to 0}\frac{7\sin(7x)}{7x}\cdot\frac{1}{\cos(7x)}$

$= 7\cdot 1\cdot\frac{1}{\cos(0)} = \boxed{7}$

d. $\lim_{x\to 0}\frac{x-2\sin(3x)}{x} = \lim_{x\to 0}\left[\frac{x}{x}-\frac{2\sin(3x)}{x}\right]$

$= \lim_{x\to 0}\left[1-2\cdot 3\frac{\sin(3x)}{3x}\right]$

$= \lim_{x\to 0} 1 - 6\lim_{x\to 0}\frac{\sin(3x)}{3x} = 1-6\cdot 1$

$= \boxed{-5}$

e. $\lim_{x\to 0}\frac{\sin 6x}{x}\cdot\frac{6}{6} = \lim_{x\to 0}\left(6\cdot\frac{\sin 6x}{6x}\right)$

$= 6\cdot 1 = \boxed{6}$

f. $\lim_{x\to 0}\frac{5(1-\cos x)}{x} = 5\lim_{x\to 0}\frac{1-\cos x}{x}$

$= 5\cdot 0 = \boxed{0}$

g. $\lim_{x\to 4}\frac{x-4}{x^2-x-12} = \lim_{x\to 4}\frac{x-4}{(x-4)(x+3)}$

$= \lim_{x\to 4}\frac{1}{x+3} = \boxed{\frac{1}{7}}$

h. $\lim_{x\to 0}\frac{\left(\frac{1}{x+5}-\frac{1}{5}\right)}{x}\cdot\frac{5(x+5)}{5(x+5)}$

$= \lim_{x\to 0}\frac{5-(x+5)}{5x(x+5)} = \lim_{x\to 0}\frac{-x}{5x(x+5)}$

$= \lim_{x\to 0}\frac{-1}{5(x+5)} = \boxed{\frac{-1}{25}}$

i. $\lim_{x\to 14}\frac{\sqrt{x-5}-3}{x-14}\cdot\frac{\sqrt{x-5}+3}{\sqrt{x-5}+3}$

$\lim_{x\to 14}\frac{x-5-9}{(x-14)(\sqrt{x-5}+3)} = \lim_{x\to 14}\frac{x-14}{(x-14)(\sqrt{x-5}+3)}$

$= \lim_{x\to 14}\frac{1}{\sqrt{x-5}+3} = \frac{1}{\sqrt{9}+3} = \boxed{\frac{1}{6}}$

j. "$\frac{0}{0}$" $\lim_{t\to\pi}\frac{\sin t}{\tan t} = \lim_{t\to\pi}\frac{\sin t}{\frac{\sin t}{\cos t}}$

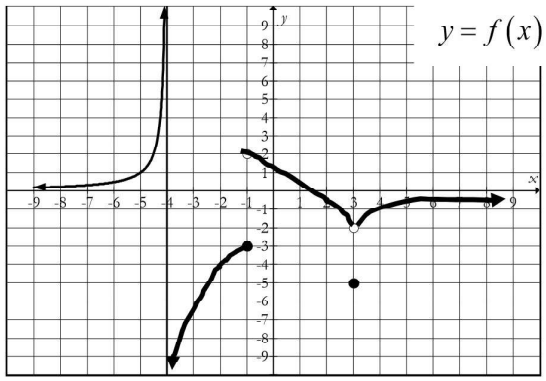
$= \lim_{t\to\pi}\sin t\cdot\frac{\cos t}{\sin t} = \lim_{t\to\pi}\cos t$

$= \cos\pi = \boxed{-1}$

8. Given: $f(x)=\begin{cases} -x^2+2, & x<-3 \\ 2x-1, & -3\le x<1 \\ |x-4|, & x\ge 1 \end{cases}$, evaluate each of the following:

a. $\lim_{x\to -3^-} f(x) =$ -7 $-(-3)^2+2$	b. $\lim_{x\to -3^+} f(x) =$ -7 $2(-3)-1$	c. $\lim_{x\to -3} f(x) =$ -7	d. $f(-3) =$ -7 $2(-3)-1$
e. $f(1) =$ 3 $\lvert 1-4\rvert$	f. $\lim_{x\to 1^-} f(x) =$ 1 $2(1)-1$	g. $\lim_{x\to 1^+} f(x) =$ 3 $\lvert 1-4\rvert$	h. $\lim_{x\to 1} f(x) =$ DNE

9. **Use the graph below to find the following limits.**



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

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

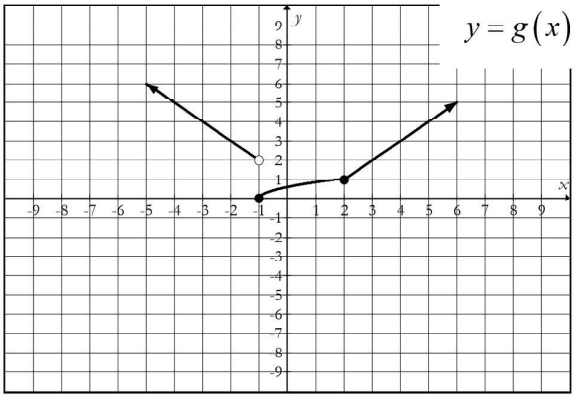
(c) $\lim_{x\to -1} f(x) =$ DNE

(d) $f(3) =$ -5

(e) $\lim_{x\to 3} f(x) =$ -2

(f) $\lim_{x\to -4} f(x) =$ DNE

10. **Use the graph below to find the following limits.**



(a) $\lim_{x\to -3} g(x) =$ 4

(b) $g(-1) =$ 0

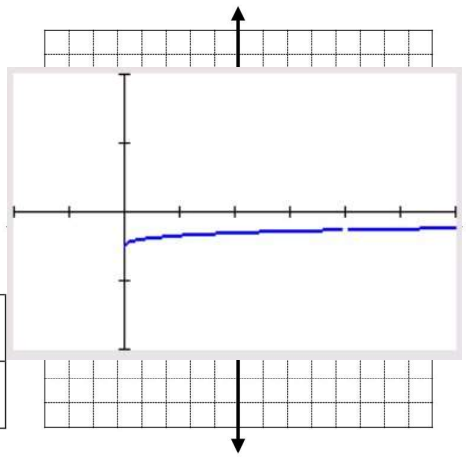
(c) $\lim_{x\to -1} g(x) =$ DNE

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

(e) $\lim_{x\to 4} g(x) =$ 3

11. Use a graphing utility to graph the function and to sketch and estimate the limit. *(Note: Use zoom feature to see graph better or change window on calculator as necessary.)* Use a table to reinforce your conclusion. Then find the limit by analytic methods.

a. $\lim_{x\to 4}\dfrac{2-\sqrt{x}}{x-4}$



Estimate: $x = -.25$

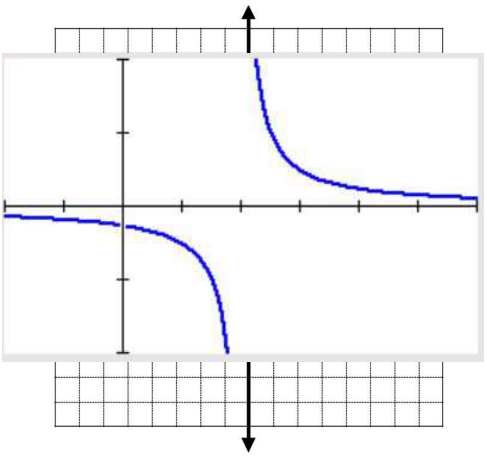
Tabular Approx:

x	3.9	3.99	3.999	4	4.001	4.01	4.1
y	-.252	-.2502	-.25	—	-.25	-.2498	-.249

Analytic: *(Show all work and watch the notation!)*

"$\frac{0}{0}$" $\lim_{x\to 4}\dfrac{(2-\sqrt{x})(2+\sqrt{x})}{(x-4)(2+\sqrt{x})} = \lim_{x\to 4}\dfrac{4-x}{(x-4)(2+\sqrt{x})}\overset{-1}{} = \lim_{x\to 4}\left(\dfrac{-1}{2+\sqrt{x}}\right) = \dfrac{-1}{2+\sqrt{4}} = \boxed{-\dfrac{1}{4}}$

b. $\lim_{x\to 0}\dfrac{\frac{1}{2}+\frac{1}{x-2}}{x}$



Estimate: $x = -.25$

Tabular Approx: $x = -.25$

x	-.1	-.01	-.001	0	.001	.01	.1
y	-.2381	-.2488	-.2499	/	-.2501	-.2513	-.2632

Analytic: *(Show all work and watch the notation!)*

$\lim_{x\to 0}\dfrac{\left(\frac{1}{2}+\frac{1}{x-2}\right)2(x-2)}{x\cdot 2(x-2)} = \lim_{x\to 0}\dfrac{x-2+2}{2x(x-2)} = \lim_{x\to 0}\dfrac{x}{2x(x-2)}$

$= \lim_{x\to 0}\dfrac{1}{2(x-2)} = \boxed{-\dfrac{1}{4}}$