Name Answer Key **Date**________

Calc I H – Ch 1 MC Review – Assignment 28 **Period**______

1) Find the limit (if it exists) of $\lim_{x\to -4}\frac{x^3+64}{x+4}$. Write a simpler function that agrees with the given function at all but one point.

$\boxed{\text{A) } 48;\ x^2-4x+16}$
B) $16;\ x^2+4x+16$
C) $16;\ x^2-4x-16$
D) Limit does not exist
E) $-48;\ x^2-4x+16$

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

$=\lim_{x\to -4}(x^2-4x+16)=48$

2) Determine the limit (if it exists) of $\lim_{x\to 0}\frac{12(1-\cos x)}{x}$:

$\boxed{\text{A) } 0}$
B) 24
C) 48
D) Does not exist
E) 4

$=12\cdot 0=0$

3) Find the limit (if it exists) of $\lim_{h\to 0}\frac{(x+h)^2+15(x+h)+12-(x^2+15x+12)}{h}$:

A) $\frac{1}{3}x^3+\frac{15}{2}x^2+12x$
B) x^3+15x^2+12x
C) 0
$\boxed{\text{D) } 2x+15}$
E) $x^2+15x+12$

$=\lim_{h\to 0}\frac{\cancel{x^2}+2xh+h^2+\cancel{15x}+15h+\cancel{12}-\cancel{x^2}-\cancel{15x}-\cancel{12}}{h}$

$=\lim_{h\to 0}\frac{\cancel{h}(2x+h+15)}{\cancel{h}}=\lim_{h\to 0}(2x+h+15)=2x+15$

4) Find the *x*-values (if any) at which the function $f(x)=\frac{x}{x^2-1}$ is **not** continuous. Which of the discontinuities are removable?

A) Continuous everywhere
$\boxed{\text{B) } 1 \text{ and } -1.\ \text{Not removable.}}$
C) Discontinuous everywhere.
D) 1 and -1. Removable.
E) None of the above.

$x=\pm 1$ Non Remov Infinite

5) Find the *x*-values (if any) at which the function $f(x)=\frac{x-8}{x^2-2x-48}$ is **not** continuous. Which of the discontinuities are removable?

A) No points of discontinuity.
B) $x=8$ (not removable), $x=-6$ (removable)
$\boxed{\text{C) } x=8 \text{ (removable)},\ x=-6 \text{ (not removable)}}$
D) No points of continuity.
E) $x=8$ (not removable), $x=-6$ (not removable)

$=\frac{\cancel{x-8}}{\cancel{(x-8)}(x+6)}=\frac{1}{x+6},\ x\neq 8$

Removable hole at $x=8$
Non Remov Infinite at $x=-6$

6) Find constants *a* and *b* such that the function

$$f(x)=\begin{cases} 15, & x\le -7 \\ ax+b & -7<x<3 \\ -15 & x\ge 3 \end{cases}$$

is continuous on the entire real line.

A) $a=3, b=0$
B) $a=3, b=-6$
C) $a=3, b=6$
D) $a=-3, b=6$
$\boxed{\text{E)}\quad a=-3, b=-6}$

$$\lim_{x\to -7^-} f(x) = \lim_{x\to -7^+} f(x)$$

$$15 = -7a+b$$

$$\lim_{x\to 3^-} f(x) = \lim_{x\to 3^+} f(x)$$

$$3a+b=-15$$

$$15=-7a+\cancel{b}$$
$$+15=-3a+\cancel{-b}$$
$$30=-10a$$
$$\boxed{a=-3}$$

$$3(-3)+b=-15$$
$$-9+b=-15$$
$$\boxed{b=-6}$$

$$f(x)=\begin{cases} 15, & x\le -7 \\ -3x-6, & -7<x<3 \\ -15, & x\ge 3 \end{cases}$$

7) Find the value of *k*, if possible, that will make the function continuous.

$$f(x)=\begin{cases} x+2k, & x\le 1 \\ kx^2+x+1 & x>1 \end{cases}$$

$\boxed{\text{A)}\quad 1}$
B) -1
C) 2
D) None exists
E) -2

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

$$1+2k = k+1+1$$
$$1+2k=k+2$$
$$k=1$$

$$f(x)=\begin{cases} x+2, & x\le 1 \\ x^2+x+1, & x>1 \end{cases}$$

8) Find the limit. $\lim_{x\to 0}\dfrac{\sin(7x)}{\sin(9x)}$

$$= \lim_{x\to 0} \frac{\sin(7x)}{x}\cdot\frac{x}{\sin(9x)}\cdot\frac{7}{7}\cdot\frac{9}{9}$$

$$= \lim_{x\to 0} \frac{\sin(7x)}{7x}\cdot\frac{9x}{\sin(9x)}\cdot\frac{7}{9}$$

$$= 1\cdot 1\cdot\frac{7}{9} = \frac{7}{9}$$

A) $+\infty$
B) 0
$\boxed{\text{C)}\quad 7/9}$
D) 1
E) $9/7$

9) Find the limit. $\lim_{x\to 0}\dfrac{\sin^2 x}{\tan^2 x}$

$$= \lim_{x\to 0}\frac{\sin^2 x}{\frac{\sin^2 x}{\cos^2 x}} = \lim_{x\to 0}\frac{\cancel{\sin^2 x}}{1}\cdot\frac{\cos^2 x}{\cancel{\sin^2 x}} = 1$$

A) $+\infty$
$\boxed{\text{B)}\quad 1}$
C) $-\infty$
D) 0
E) -1

10) Find the limit. $\lim_{x\to 12}\dfrac{x^2-12x}{(x^2+144)(x-12)}$

$$= \lim_{x\to 12}\frac{x\cancel{(x-12)}}{(x^2+144)\cancel{(x-12)}} = \lim_{x\to 12}\frac{x}{x^2+144}$$

$$= \frac{12}{2(144)} = \frac{1}{24}$$

A) -24
B) $-1/24$
C) 24
$\boxed{\text{D)}\quad 1/24}$
E) 12

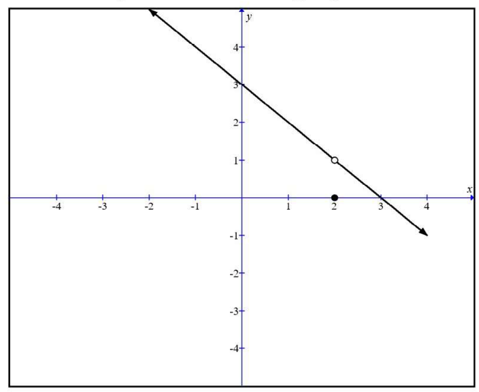
11) Complete the table and use the result to estimate the limit. $\lim_{x \to -3} \dfrac{\sqrt{6x+26}-\sqrt{8}}{x+3}$:

x	-3.1	-3.01	-3.001	-3	-2.999	-2.99	-2.9
$f(x)$	1.081	1.063	1.061	und	1.060	1.059	1.041

A) -1.06066
B) 1.18566
C) 1.06066
D) -1.227327
E) -1.31066

12) Let $f(x) = \begin{cases} 3-x, & x \neq 2 \\ 0 & x = 2 \end{cases}$

Determine $\lim_{x \to 2} f(x)$. (Hint: Use the graph of the function.)

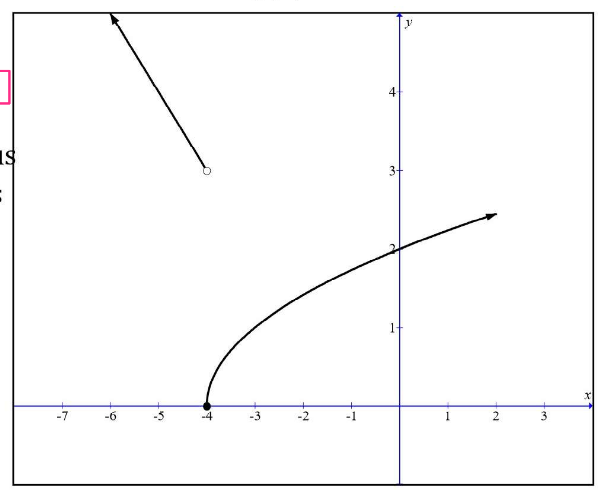


A) 1
B) 0
C) 3
D) 5
E) Does not exist

13) Use the graph to determine the following limits, and discuss the continuity of the function at $x = -4$.

(i) $\lim_{x \to -4^+} f(x)$ =0 (ii) $\lim_{x \to -4^-} f(x)$= 3 (iii) $\lim_{x \to -4} f(x)$ DNE

A) 3, 0, Does not exist, Not continuous
B) 0, 3, Does not exist, Not continuous
C) 0, 3, 0, Continuous
D) -4, 0, Does not exist, Not continuous
E) -4, 3, Does not exist, Not continuous



14) First rationalize the numerator, then find the limit. $\lim_{x\to 0}\frac{(\sqrt{x+16}-4)}{x}\frac{(\sqrt{x+16}+4)}{(\sqrt{x+16}+4}$

$$= \lim_{x\to 0}\frac{x+\cancel{16}-\cancel{16}}{x(\sqrt{x+16}+4)} = \lim_{x\to 0}\frac{\cancel{x}}{\cancel{x}(\sqrt{x+16}+4)} = \lim_{x\to 0}\frac{1}{\sqrt{x+16}+4}$$

$$= \boxed{\frac{1}{8}}$$

15) Find $\lim_{h\to 0}\frac{\frac{3}{3}\left(\frac{1}{3+h}\right)-\frac{1}{3}\left(\frac{3+h}{3+h}\right)}{h}$

$$= \lim_{h\to 0}\frac{\frac{3-(3+h)}{3(3+h)}}{h} = \lim_{h\to 0}\frac{\cancel{3}-\cancel{3}-h}{3(3+h)}\cdot\frac{1}{h} = \lim_{h\to 0}\frac{-\cancel{h}}{3(3+h)}\cdot\frac{1}{\cancel{h}}$$

$$= \lim_{h\to 0}\frac{-1}{3(3+h)} = \boxed{-\frac{1}{9}}$$

Answer Key

1) A	2) A	3) D	4) B	5) C	6) E	7) A
8) C	9) B	10) D	11) C	12) A	13) B	

14) $\lim_{x\to 0}\frac{\sqrt{x+16}-4}{x}\bullet\frac{\sqrt{x+16}+4}{\sqrt{x+16}+4}=\lim_{x\to 0}\frac{1}{\sqrt{x+16}+4}=\frac{1}{8}$

15) $\lim_{h\to 0}\frac{-h}{3h(3+h)}=\lim_{h\to 0}\frac{-1}{3(3+h)}=-\frac{1}{9}$