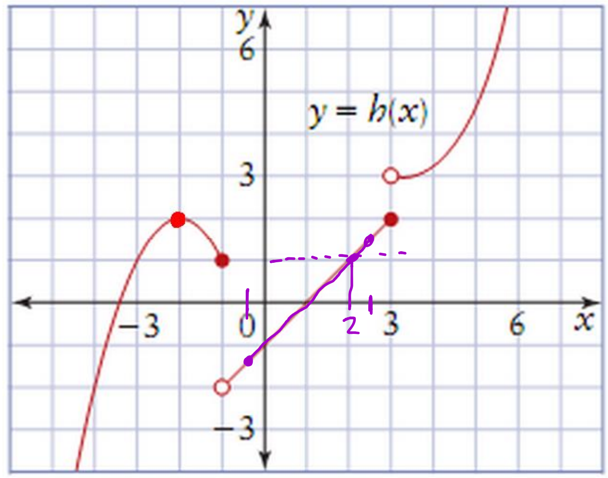
Name KEY Date 18 checks total Period____________

AP Calculus TEST: 1.1-1.5 No Calculator

Part I: Multiple Choice—write the CAPITAL LETTER in the blank to the left of the problem number.

Use the graph of the function $h(x)$, shown below right, to answer questions 1-3.



B **1**. The largest value of $w \in \mathbb{R}$ such that $h(x)$ is continuous on $(-3, w]$ is

(A) 0 (B) −1 (C) −2 (D) −1.1 (E) No such value exists

C **2**. On the interval $-0.5 \le x \le 2.5$, the IVT guarantees a value $-0.5 < j < 2.5$ such that $h(j) = 1$. What is j?

(A) 0 (B) 1 (C) 2 (D) 3 (E) the IVT does not apply

C **3**. $\lim\limits_{x \to -1^+} h(h(x)) =$

(A) 0 (B) 1 (C) 2 (D) 3 (E) No such value exists

D 4. The line $y = -7$ is a horizontal asymptote to the graph of which of the following functions?

(A) $y = -\dfrac{\sin(7x)}{x}$ (B) $y = \dfrac{-7x^2 + 2x - 1}{\sqrt{x^2 + 50}}$ (C) $y = \dfrac{1}{x+7}$ (D) $y = \dfrac{21x^3 - 2x^2 - 7}{7 + 9x - 3x^3}$ (E) $y = \dfrac{-7x}{1-x}$

$\dfrac{21x^3}{-3x^3} \rightarrow \boxed{-7 = y}$

B 5. $\lim\limits_{x \to 6} \dfrac{1 - \sqrt{x-5}}{x(x-6)}$ $0/0$ $\cdot \dfrac{(1+\sqrt{x-5})}{(1+\sqrt{x-5})}$ (A) $-\dfrac{1}{2}$ (B) $-\dfrac{1}{12}$ (C) $\dfrac{1}{2}$ (D) $\dfrac{1}{12}$ (E) $-\dfrac{1}{6}$

$\lim\limits_{x \to 6} \dfrac{1-(x-5)}{x(x-6)(1+\sqrt{x-5})}$

$\lim\limits_{x \to 6} \dfrac{-x+6}{x(x-6)(1+\sqrt{x-5})}$

$\lim\limits_{x \to 6} \dfrac{-\cancel{(x-6)}}{x\cancel{(x-6)}(1+\sqrt{x-5})}$

$\dfrac{-1}{6(1+1)}$

$\dfrac{-1}{12}$

A ____ 6. $\lim_{x\to 4} \dfrac{x-4}{\dfrac{4}{x}-\dfrac{3}{x-1}} \cdot \dfrac{x(x-1)}{x(x-1)}$ (A) 12 (B) -12 (C) $-\dfrac{1}{12}$ (D) $\dfrac{1}{12}$ (E) DNE

$\lim_{x\to 4} \dfrac{x(x-4)(x-1)}{4(x-1)-3x}$

$\lim_{x\to 4} \dfrac{x(x-4)(x-1)}{4x-4-3x}$

$\lim_{x\to 4} \dfrac{x\cancel{(x-4)}(x-1)}{\cancel{(x-4)}}$

$4(4-1)$

12

C ____ 7. Evaluate $\lim_{x\to 0^-}\left(\dfrac{5\cot 2x}{2\csc 5x}-\dfrac{|3x|}{4x}+\dfrac{x^3+1}{x+1}\right)=$ (A) DNE (B) $\dfrac{13}{2}$ (C) 8 (D) $\dfrac{5}{4}$ (E) $\dfrac{11}{4}$

flip

Plug in $x=-1$

Direct Sub

Jump man

$\left(\dfrac{5}{2}\right)\left(\dfrac{5}{2}\right)-\dfrac{3}{-4}+\dfrac{1}{1}$

$\dfrac{25}{4}+\dfrac{3}{4}+1$

$\dfrac{28}{4}+1$

$7+1$

8

$$f(x)=\begin{cases}\dfrac{(3x+1)(x-3)}{2x-6}, & x\neq 3\\ k, & x=3\end{cases}$$

E ____ 8. Let f be the function defined above. For what value of k is f continuous at $x=3$?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 5

$\lim_{x\to 3} \dfrac{(3x+1)\cancel{(x-3)}}{2\cancel{(x-3)}}$

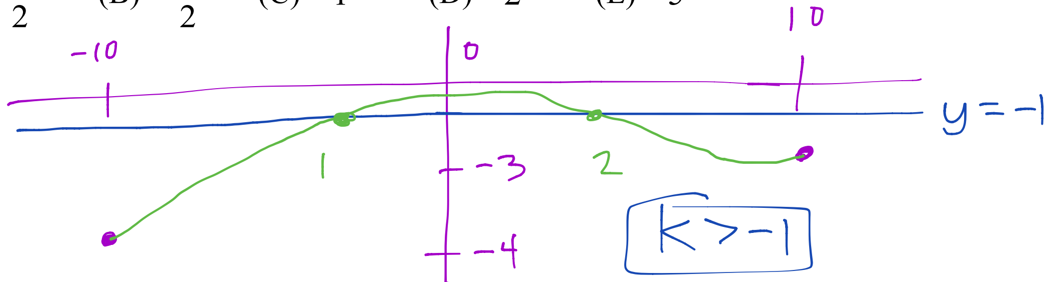
$\dfrac{10}{2}$

5

B ____ 9. The function f is continuous on $[-10,10]$ and has values given in the table below. If the equation $f(x)=-1$ has at least 2 solutions in the interval $(-10,10)$ if $p=$

x	-10	0	10
$f(x)$	-4	p	-3

(A) $-\dfrac{3}{2}$ (B) $-\dfrac{1}{2}$ (C) -1 (D) -2 (E) -5



Part II: Free Response: Answer all questions in the space provided.. **Show all steps on part (e), and all parts, use proper notation, notation, notation. No Notation, No-No point!!**

10. Let $f(x)$ be the totally awesome piece wise function given below.

$$f(x)=\begin{cases} \dfrac{3x^5+7x^3-2x+1}{\sqrt{4x^{10}+2x^4+11}}, & x\le -3 \\ ax^2+2b, & -3<x<-1 \\ 5, & x=-1 \\ 3bx-a, & -1<x<-\dfrac{1}{2} \\ \dfrac{3x^2}{\sin(3x)\tan(5x)}, & -\dfrac{1}{2}\le x<1 \\ \dfrac{2x+1}{x-2}, & x\ge 1 \end{cases}$$

(a) Find $\lim\limits_{x\to -\infty} f(x) = \lim\limits_{x\to-\infty} \dfrac{3x^5+\cdots}{2x^5} = \boxed{-\dfrac{3}{2}}$ √1 √2

Plug in a neg. into original leading terms to get the sign

(b) Find $\lim\limits_{x\to 0} f(x) = \lim\limits_{x\to 0} \dfrac{3x^2}{\sin(3x)\cdot\tan(5x)}$ 0/0

$\lim\limits_{x\to 0} \left[\dfrac{1}{5}\right]\left[\dfrac{3x}{\sin 3x}\right]\cdot\left[\dfrac{5x}{\tan 5x}\right]$

$\left(\dfrac{1}{5}\right)(1)(1) = \boxed{\dfrac{1}{5}}$ √3

(c) Find $\lim\limits_{x\to 2^+} f(x) =$ 5/0 $\boxed{\text{DNE or } \infty}$ √4

(d) Does the IVT apply to $f(x)$ on $[1,3]$? Why or why not? Be specific.

No, the MVT does not apply, ($\sqrt{5}$)
since f(x) is not continuous ($\sqrt{6}$)
at $x = 2 \in [1,3]$.

(e) If a and b are constants that make $f(x)$ continuous at $x = -1$, **what is the value of** a?

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

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

$f(-1) = 5$

$$\begin{cases} a + 2b = 5 \\ -a - 3b = 5 \end{cases}$$

($\sqrt{7}$) ($\sqrt{8}$)

$-b = 10$

$b = -10$

So $a = 5 - 2b$

$a = 5 - 2(-10)$

$\boxed{a = 25}$ ($\sqrt{9}$)

$\boxed{\text{9 checks}}$