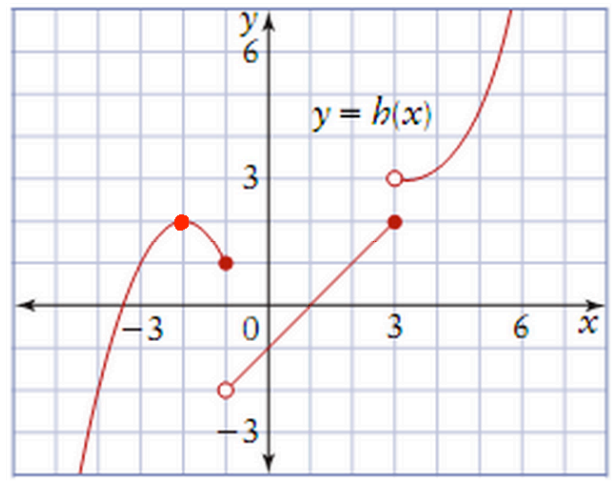Name_____ Date_____ Period_____

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.

_____ 1. The smallest value of $a \in \mathbf{R}$ such that $h(x)$ is continuous
   on $[a,3]$ is
   (A) 0   (B) −1   (C) −0.9   (D) No such value exists

_____ 2. On the interval $-4 \le x \le -1$, the IVT guarantees a value
   $-4 < k < -1$ such that $h(k) = P$. According to the IVT,
   which of the following of P is NOT guaranteed?
   (A) 0   (B) $\dfrac{1}{2}$ (C) −1   (D) 2

_____ 3. $\displaystyle\lim_{x \to -1^-} h(h(x)) =$
   (A) 0   (B) 1   (C) 2   (D) −2

_____ 4. The line $y = -5$ is a horizontal asymptote to the graph of which of the following functions?

   (A) $y = e^{-x} + 5$ (B) $y = \dfrac{25x^3 + 2x - 1}{\sqrt{25x^6 + 50}}$ (C) $y = \dfrac{50x^3 - 2x^2 - 7}{7 + 9x + 10x^3}$ (D) $y = -\dfrac{\sin(10x)}{5x}$

_____ 5. $\displaystyle\lim_{x \to -1} \dfrac{2 - \sqrt{x+5}}{(x-1)(x+1)} =$ (A) $\dfrac{1}{8}$ (B) $-\dfrac{1}{8}$ (C) $\dfrac{1}{2}$ (D) $-\dfrac{1}{2}$

_____ 6. $\displaystyle\lim_{x\to 5}\frac{\dfrac{1}{x+2}-\dfrac{1}{7}}{x-5}=$ 　　 (A) -1 　 (B) $\dfrac{1}{49}$ 　 (C) $-\dfrac{1}{49}$ 　 (D) $\dfrac{1}{7}$

_____ 7. Evaluate $\displaystyle\lim_{x\to 0^{+}}\left(\frac{(x-1)^{3}}{x^{3}-1}+\frac{4\tan 3x}{3\tan 4x}-\frac{x}{|x|}\right)=$ 　 (A) 1 　 (B) 3 　 (C) 8 　 (D) $\dfrac{16}{9}$

$$f(x)=\begin{cases}\dfrac{x^{2}+\sin^{2}2x}{x^{2}}, & x\neq 0\\[2mm] b, & x=0\end{cases}$$

_____ 8. Let f be the function defined above. For what value of b is f continuous at $x=0$?
　　　　(A) 2 　　 (B) 3 　　 (C) 5 　　 (D) no such value exists

_____ 9. The function f is continuous on $[-4,5]$ and has values given in the table below. The equation $f(x)=6$ at least two solutions in the interval $(-4,5)$ if $p=$

x	-4	0	5
$f(x)$	1	p	4

　　　　(A) 6 　　 (B) 6.1 　　 (C) 5.9 　　 (D) 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.

$$f(x) = \begin{cases} \dfrac{2x^5 + 7x^3 - 2x + 1}{\sqrt{9x^{12} + 2x^4 + 11}}, & x \le -3 \\[4mm] ax^2 - b, & -3 < x < -1 \\[2mm] 10, & x = -1 \\[2mm] 2ax - 3b, & -1 < x < -\dfrac{1}{2} \\[4mm] \dfrac{x^2 - 4x + 3}{x^2 |2x - 2|}, & -\dfrac{1}{2} \le x < 3 \\[4mm] \dfrac{(x-3)^2}{4 - x}, & x \ge 3 \end{cases}$$

(a) Find $\displaystyle\lim_{x \to -\infty} f(x) =$
(b) Find $\displaystyle\lim_{x \to 1^-} f(x) =$
(c) Find $\displaystyle\lim_{x \to 4^+} f(x) =$

(d) Is $f(x)$ continuous at $x = 3$? Justify using the 3-step definition of continuity at a point.

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