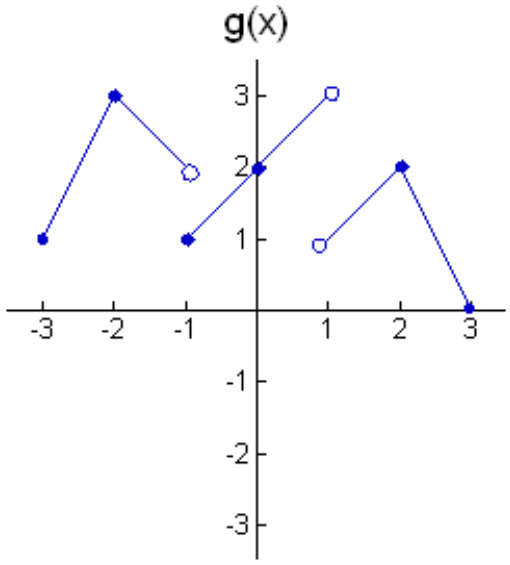
Name_____ Date_____ Period_____

AP Calculus TEST: 3.1-3.5—Limits and Continuity. 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 $g(x)$ shown at right to answer questions 1-3.



_____ 1. $\lim_{x\to -1^+} g(x^2) + \lim_{x\to -2}\left[g(x)\right]^2 + g(-1) =$

(A) 10 (B) 11 (C) 12 (D) 13 (E) DNE

_____ 2. $\lim_{x\to 3^-} g\left(g\left(x\right)\right) =$

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

_____ 3. Find the number $x = b$ such that $g(x)$ is continuous in $(-1, b)$ but not in $[-1, b]$.

(A) -1 (B) 0 (C) $\frac{1}{2}$ (D) 0.999999 (E) 1

_____ 4. Evaluate $\lim_{x\to 0}\left(\frac{3\cot 6x}{2\csc 2x}+1\right)$

(A) DNE (B) 0 (C) $\frac{11}{2}$ (D) $\frac{3}{2}$ (E) 3

_____ 5. Evaluate $\lim_{x\to 0}\frac{1-\cos 4x}{x+1}$

(A) DNE (B) 0 (C) 1 (D) -1 (E) 4

_____ 6. If $f(x) = \begin{cases} 2x^2+1, & x<-1 \\ -\frac{3}{x}, & x\ge -1 \end{cases}$, which of the following is NOT true?

(A) $\lim_{x\to -1^+} f(x) = f(-1)$ (B) $f(x)$ is continuous at $x=-1$

(C) $\lim_{x\to\infty} f(x) = 0$ (D) $f(x)$ has a vertical asymptote at $x=0$ (E) $\lim_{x\to -1^-} f(x) = -1$

_____ 7. If $\sec x \le M(x) \le e^x$, for all x in an interval containing $x=0$, then $\lim_{x\to 0} M(x) =$

(A) DNE (B) 0 (C) 1 (D) -1 (E) Not enough information

_____ 8. If $g(x) = \cos x$, then on the interval $\left[\frac{7\pi}{6}, \frac{7\pi}{4}\right]$, by the IVT, $g(x)$ MUST equal what value for some $x \in \left(\frac{7\pi}{6}, \frac{7\pi}{4}\right)$?

(A) -1 (B) 1 (C) $\frac{4\pi}{3}$ (D) 0 (E) $\frac{\sqrt{3}}{2}$

Part II: Free Response:

9. Evaluate 5 of the 6. For each, show all steps and work. Careful rewriting the "lim" each time!!!

a) $\lim_{x\to 0} \frac{\tan 2x + x}{5x} =$

b) $\lim_{x\to 0} \frac{4x \sin x}{1-\cos x} =$

c) $\lim_{x\to -2} \frac{x^2-4}{\sqrt{6+x}-2} =$

d) $\lim_{x\to 3} \frac{\frac{2}{x+2} - \frac{2}{5}}{x-3} =$

e) $\lim_{x\to -\infty} \frac{4x^5+2x^2-3x+1}{\sqrt{9x^{10}+11x^9+12x^2+13x+14}} =$

f) $\lim_{x\to 5^-} \frac{x^2|10-2x|}{\sin\left(\frac{x\pi}{6}\right)\left(3x^2-18x+15\right)} =$