Name_____ Date_____ Defunct Political Party_____

AP Calculus TEST: 2.1-2.4 , NO CALCULATOR

Part I: Multiple Choice—Put the correct CAPITAL letter in the space to the left of each question.

_____ 1. In the *xy*-plane, the line $5x + y = k$, where *k* is a constant, is tangent to the graph of $y = 2x^2 + 3x - 1$. What is the value of *k* ?

(A) -2 (B) -9 (C) -5 (D) 7 (E) 4

_____ 2. If $f(x) = \dfrac{6x+1}{7x-3}$, find $f'(-1)$.

(A) $-\dfrac{1}{4}$ (B) $-\dfrac{11}{100}$ (C) $-\dfrac{25}{16}$ (D) $\dfrac{25}{16}$ (E) $\dfrac{11}{100}$

_____ 3. $\lim\limits_{h\to 0} \dfrac{2(2+h)^5 - 64}{h} =$

(A) DNE (B) 64 (C) 160 (D) 100 (E) 36

_____ 4. If $f(x) = \begin{cases} 2ax^2 + x + 2, & x < -1 \\ bx + 3, & x \geq -1 \end{cases}$, what is the value of b that makes $f(x)$ differentiable at $x = -1$?

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

_____ 5. If $f(x) = -2x^3 + \dfrac{3}{x^2} - \sqrt{x} + \dfrac{2}{\sqrt[3]{x^2}}$, then $f'(1) =$

(A) $-\dfrac{11}{6}$ (B) $\dfrac{67}{15}$ (C) $\dfrac{-67}{6}$ (D) $\dfrac{83}{6}$ (E) $\dfrac{-83}{6}$

_____ 6. If $f(x)=15-|11x+44|$ for all x, what is the value of $f'(4)$

(A) -11 (B) 11 (C) 44 (D) -44 (E) DNE

_____ 7. $\frac{d}{dx}\left[3x^4\cos x\right]=$

(A) $-12x^3\sin x$ (B) $3x^3(4\cos x+x\sin x)$ (C) $3x^3(4\sin x-x\cos x)$

(D) $12x^3\sin x$ (E) $3x^3(4\cos x-x\sin x)$

$$g(x)=\begin{cases}4x+1, & x\le 2\\ x^2+6, & x>2\end{cases}$$

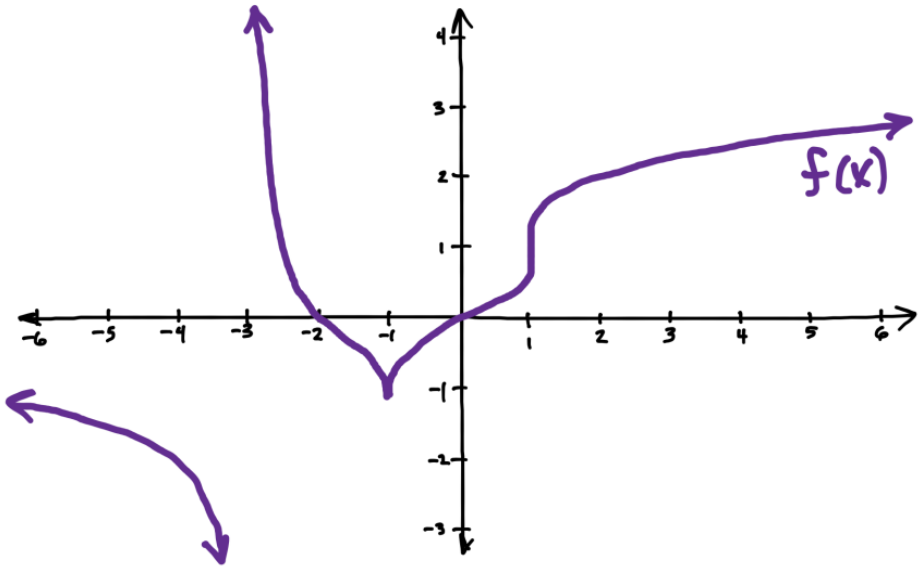
_____ 8. Let f be the function given above. Which of the following statements are true about g ?

I. $\lim_{x\to 2} g(x)$ exists

II. g is continuous at $x=2$

III. g is differentiable at $x=2$

(A) None (B) I only (C) III only (D) I & II only (E) I, II, & III



_____ 9. The graph of a function $f(x)$ is given above. The graph of $f(x)$ has a vertical asymptote at $x=-3$, a vertical tangent line at $x=1$, and x-intercepts at $x=-2$ and $x=0$. For what values of x is the function $f(x)$ is **not** differentiable?

(A) -3, -1, 1 only (B) -3, -1 only (C) -3, 1 only (D) -3 only (E) -1, 1 only

Part II: Free Response—Do all work in the space provided.

10. If $g(x) = 2x^3 - 4x^2 + 3x - 11$

(a) Let $P(x) = g'(x)$. Find $P(x)$ and $P'(x)$.

(b) Find $P(-1)$ and $P'(-1)$.

(c) Find the equation of the tangent line, in Taylor Form, of $P(x)$ at $x = -1$.

(d) Find the equation of the normal line, in Taylor Form, of $P(x)$ at $x = -1$.

(e) The equation of the normal line to $P(x)$ at $x = -1$ intersects the graph of $P(x)$ at another x-value. Find this x-value. Show the work that leads to your answer.