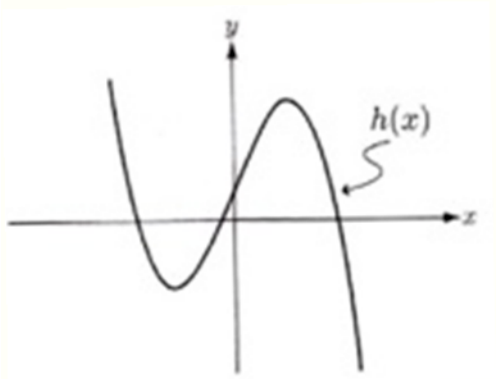
Name_____ Date_____ Pencil Brand_____

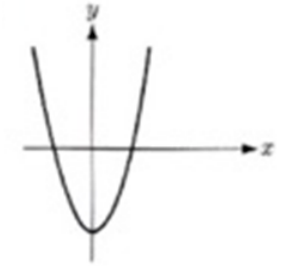
AP Calculus TEST: 2.1-2.4 , NO CALCULATOR

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

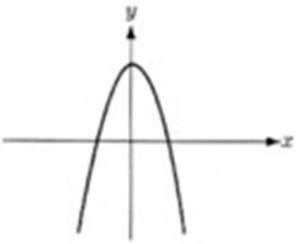


_____ 1. The graph of a function h is shown above. Which of the following could be the graph of h', the derivative of h?

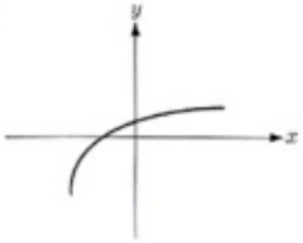
(A)



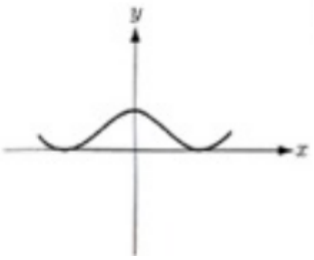
(B)



(C)



(D)



(E)

_____ 2. In the *xy*-plane, the line $2x - y = k$, where *k* is a constant, is tangent to the graph of $y = \frac{3}{2}x^2 - 4x + 1$. What is the value of *k*?

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

$$f(x)=\begin{cases}2cx+d & \text{for } x\le -1\\ x^2+cx & \text{for } x>-1\end{cases}$$

_____ 3. Let f be the function defined above, where c and d are constants. If f is differentible at $x=-1$, what is the value of $c\cdot d$?

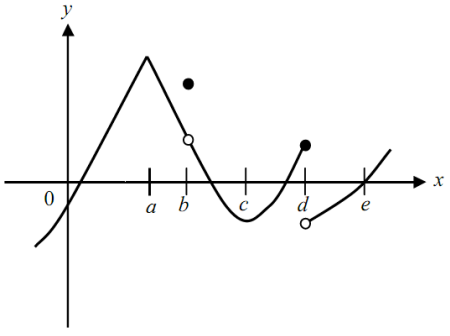
(A) 1 (B) 2 (C) 4 (D) 6 (E) 8

_____ 4. If $y=\dfrac{3x+2}{2x+3}$, then $\dfrac{dy}{dx}=$

(A) $\dfrac{13}{(2x+3)^2}$ (B) $\dfrac{-13}{(2x+3)^2}$ (C) $\dfrac{-1}{(2x+3)^2}$ (D) $\dfrac{5}{(2x+3)^2}$ (E) $\dfrac{-5}{(2x+3)^2}$

_____ 5. $\lim\limits_{h\to 0}\dfrac{2\cos\left(\dfrac{7\pi}{6}+h\right)-2\cos\left(\dfrac{7\pi}{6}\right)}{h}=$

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



Graph of f

_____ 6. The graph of a function f is shown above. At which value(s) of x is f not differentiable?

I. $x=a$ II. $x=b$ III. $x=d$

(A) I only (B) I & II only (B) II & III only (C) I & III only (D) I, II, & III

$$g(x)=\begin{cases} x+2, & x\le 3 \\ x^2-4, & x>3 \end{cases}$$

_____ 7. Let f be the function given above. Which of the following statements are true about g ?

I. $\lim_{x\to 3} g(x)$ exists

II. g is continuous at $x=3$

III. g is differentiable at $x=3$

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

_____ 8. If $f(x)=(x-2)\sin x$, then $f'(0)=$

(A) -3 (B) -2 (C) 0 (D) 2 (E) 3

_____ 9. If $f(x)=2-4|x+6|$ for all x, then the value of the derivative $f'(x)$ at $x=6$ is

(A) -4 (B) 0 (C) 4 (D) 2 (E) DNE

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

10. If $g(x)=\frac{2}{3}x^3+\frac{1}{2}x^2-x+5$

(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.