

Name _____ Date _____ Defunct Technology _____

AP Calculus 9-weeks TEST: 1.1-2.7

No Calculator

Write the CAPITAL LETTER in the blank to the left of the problem number.

____ 1. $\lim_{x \rightarrow 0} \frac{3x^2 + 5 \cos x - 5}{2x} =$
(A) 0 (B) $\frac{5}{2}$ (C) 5 (D) DNE

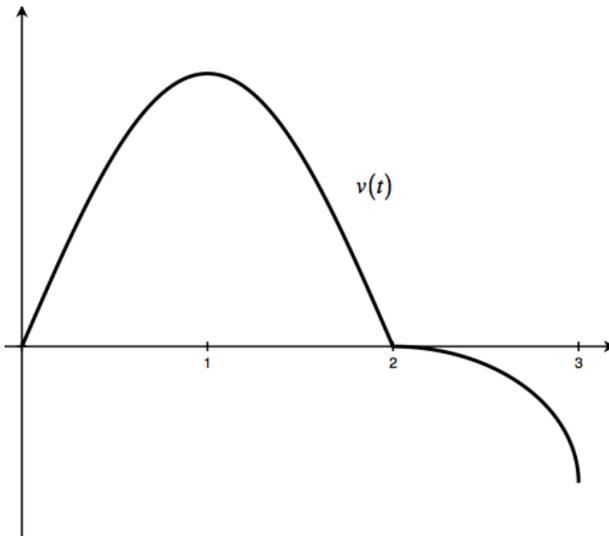
____ 2. Which of the following gives the derivative of the function $f(x) = x^2$ at the point $(2, 4)$?

(A) $\lim_{h \rightarrow 0} \frac{(x+2)^2 - x^2}{4}$ (B) $\lim_{x \rightarrow 2} \frac{(2+h)^2 - 2^2}{h}$ (C) $\lim_{h \rightarrow 0} \frac{(2+h)^2 - 2^2}{h}$ (D) $\lim_{h \rightarrow 0} \frac{(4+h)^2 - 4^2}{h}$

____ 3. If $x^2 - 2xy + 3y^2 = 8$, then $\frac{dy}{dx} =$
(A) $\frac{8+2y-2x}{6y-2x}$ (B) $\frac{3y-x}{y-x}$ (C) $\frac{2x-2y}{6y-2x}$ (D) $\frac{y-x}{3y-x}$

____ 4. Find k so that $f(x) = \begin{cases} \frac{x^2 - 16}{x - 4}, & x \neq 4 \\ k, & x = 4 \end{cases}$ is continuous for all x .
(A) 0 (B) 16 (C) 8 (D) no such k exists

____ 5. Which of the following is true regarding the asymptotic behavior of the function $f(x) = \frac{1}{\sqrt{x}} + 3$, for $x > 0$.
(A) HA at $y = 3$, VA at $x = 0$ (B) HA at $y = 0$, VA at $x = 3$
(C) HA at $y = 0$, VA at $x = 0$ (D) HA at $y = 3$, VA at $x = 3$



6. A particle moving along the x -axis is moving with a velocity $v(t)$ whose graph is given above. For what open intervals is the speed of the particle increasing?

- I. $x \in (0,1)$
 - II. $x \in (1,2)$
 - III. $x \in (2,3)$
- (A) I only (B) I and II only (C) I and III only (D) III only

7. If $f(x) = \begin{cases} x^2 + 1, & -1 \leq x < 1 \\ -x + 1, & 1 \leq x < 2 \\ -1, & x > 2 \end{cases}$, at which of the following values of x is $f(x)$ not continuous?

- I. $x = -1$
 - II. $x = 1$
 - III. $x = 2$
- (A) II only (B) I and II only (C) I and III only (D) II and III only

8. $\frac{d}{dx} \left[x^3 (x+4)^2 \right] =$
 (A) $5x^4 + 32x^3 + 48x^2$ (B) $5x^4 + 16x^3 + 48x^2$ (C) $6x^5 + 32x^3 + 48x^2$ (D) $6x^5 + 16x^3 + 48x^2$

9. If $f(x) = \cos^3(x+1)$, then $f'(\pi) =$
 (A) $3\cos^2(\pi+1)$ (B) $-3\cos^2(\pi+1)\sin(\pi+1)$ (C) $3\cos^2(\pi+1)\sin(\pi+1)$ (D) $3\pi\cos^2(\pi+1)$

- ____ 10. If $f(x) = \sec x + \csc x$, then $f'(x) =$
(A) $\sec^2 x + \csc^2 x$ (B) $\csc x - \sec x$ (C) $\sec x \tan x + \csc x \cot x$ (D) $\sec x \tan x - \csc x \cot x$

- ____ 11. In the xy -plane, the line $x + y = k$, where k is a constant, is tangent to the graph of $y = x^2 + 3x + 1$. What is the value of k ?
(A) -3 (B) -2 (C) -1 (D) 1

- ____ 12. If $y = \frac{2x+3}{3x+2}$, then $\frac{dy}{dx} =$
(A) $\frac{12x+13}{(3x+2)^2}$ (B) $\frac{12x-13}{(3x+2)^2}$ (C) $\frac{5}{(3x+2)^2}$ (D) $\frac{-5}{(3x+2)^2}$

- ____ 13. A particle moves along the y -axis so that at time $t \geq 0$, its position is given by $y(t) = 2t^3 - 21t^2 + 72t - 53$. At what time, t , is the particle at rest?
(A) $t = 3$ only (B) $t = \frac{7}{2}$ only (C) $t = 3$ and $t = \frac{7}{2}$ (D) $t = 3$ and $t = 4$

- ____ 14. The function f is continuous on $[-3, 2]$ and has values given in the table below. If the equation $f(x) = 2$ has at least 2 solutions in the interval $(-3, 2)$ if $k =$

x	-3	0	2
$f(x)$	5	k	3.2

- (A) 5 (B) 3.2 (C) 2 (D) -3

$$f(x) = \begin{cases} ax^3 - 6x, & x \leq 1 \\ bx^2 + 4, & x > 1 \end{cases}$$

_____ 15. If the above function $f(x)$ is differentiable for all x , then $a = ?$

- (A) 1 (B) -14 (C) -24 (D) 26

_____ 16. An equation of the normal line to the graph of $y = \sqrt{3x^2 + 2x}$ at $(2, 4)$ is

- (A) $-4x + y = 20$ (B) $4x + 7y = 20$ (C) $-7x + 4y = 2$ (D) $4x + 7y = 36$

_____ 17. A calculus book falling on the Planet Xelkji has a height, h , at any time, t , given by

$h(t) = t^3 - 6t^2 + 9t$. What is the acceleration of the book at time $t = 4$?

- (A) 9 (B) -9 (C) 12 (D) -12

_____ 18. If $f(x) = \sqrt[3]{3x}$, then $f'(\sqrt{3}) =$

- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1}{\sqrt[3]{3}}$

_____ 19. If $f(x) = (3x^2 - 4x - 1)\tan x$, then $f'(0) =$

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

_____ 20. If $f(x) = 5 - |7x + 21|$ for all x , then the value of the derivative $f'(x)$ at $x = -3$ is

- (A) -7 (B) 7 (C) 5 (D) DNE