

Name _____ Date _____ Fall Beverage _____

AP Calculus 9-weeks TEST: 1.1-2.4

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. $\lim_{x \rightarrow 5} \frac{x^2 + 2x - 35}{x^2 - 25} =$

- (A) 7 (B) $\frac{6}{5}$ (C) 5 (D) DNE

_____ 4. If a function $f(x)$ is differentiable at $x = 4$, which of the following must be true?

I. $\lim_{x \rightarrow 4} f(x)$ exists

II. $f(4)$ exists

III. $f(x)$ is continuous at $x = 4$

- (A) I only (B) II only (C) I and II only (D) I, II, and III

_____ 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. If the function $s(t) = \cos t - t^2 + 4t$ represents the position of a particle in feet after t seconds, then the velocity of the particle, in ft/sec, at $t = 2$ seconds is

- (A) $\cos 2$ (B) $-\cos 2$ (C) $-\sin 2$ (D) $\sin 2$

_____ 7. $\lim_{x \rightarrow \infty} \frac{x^2 - 3x + 7}{\sqrt{4x^4 - 3x^3 + 2x^2}} =$

- (A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) DNE

_____ 8. 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

_____ 9. $\frac{d}{dx} [x^3(x+4)^2] =$

- (A) $5x^4 + 32x^3 + 48x^2$ (B) $5x^4 + 16x^3 + 48x^2$ (C) $6x^5 + 32x^3 + 48x^2$ (D) $6x^5 + 16x^3 + 48x^2$

_____ 10. If $f(x) = 5\sqrt[3]{x^4} - 5$, then $f'(8) =$

- (A) 10 (B) 40 (C) $\frac{80}{3}$ (D) $\frac{40}{3}$

_____ 11. 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) $\sec x \tan x - \csc x \cot x$

_____ 12. 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

_____ 13. 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) $\frac{-5}{(3x+2)^2}$

_____ 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. The equation of the tangent line to $y = 4x^3 - 7x^2$ at $x = 3$ is

- (A) $y = -45 + 66(x - 3)$ (B) $y = 45 + 66(x - 3)$ (C) $y = -45 - 66(x - 3)$ (D) $y = 45 - 66(x - 3)$

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

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

- (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