

Name

KEY

Date

10/12/16

Fall Beverage

Wassail!

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.

A

1.  $\lim_{x \rightarrow 0} \frac{3x^2 + 5 \cos x - 5}{2x} =$

- (A) 0 (B)
- $\frac{5}{2}$
- (C) 5 (D) DNE

C

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)
- $\lim_{h \rightarrow 0} \frac{(4+h)^2 - 4^2}{h}$

B

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

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

D

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

A

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  $x = 3$

C

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)  $\sin 2$

B

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

D

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

A

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)  $6x^5 + 16x^3 + 48x^2$

- D 10. If  $f(x) = 5\sqrt[3]{x^4} - 5$ , then  $f'(8) =$
- (A) 10      (B) 40      (C)  $\frac{80}{3}$       (D)  $\frac{40}{3}$

- D 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)  $\sec x \tan x - \csc x \cot x$

- A 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

- D 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)  $\frac{-5}{(3x+2)^2}$

- D 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

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

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

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

B 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)  $y = 45 - 66(x-3)$

C 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

B 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)  $\frac{1}{\sqrt[3]{3}}$

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

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

D 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