

A.P. CALCULUS - 9 WEEK EXAM

Directions: Answer each problem on the scantron sheet. Gauge your time. You have the period to complete the exam. If you do not know an answer, leave it blank. **NO CALCULATORS PERMITTED.**

1. Determine $\lim_{x \rightarrow 1} f(x)$ if $f(x) = \begin{cases} 3 - x, & x \neq 1 \\ 1 & , x = 1 \end{cases}$

a. 2

b. 1

c. $\frac{3}{2}$

d. Does not exist

e. None of these

2. Find $f'(x)$ for $f(x) = (2x^2 + 5)^7$

a. $7(4x)^6$

b. $7(4x)^7$

c. $28x(2x^2 + 5)^6$

d. $7(2x^2 + 5)^6$

e. None of these

3. Find $\frac{dy}{dx}$ if $x^2 + y^2 = 2xy$

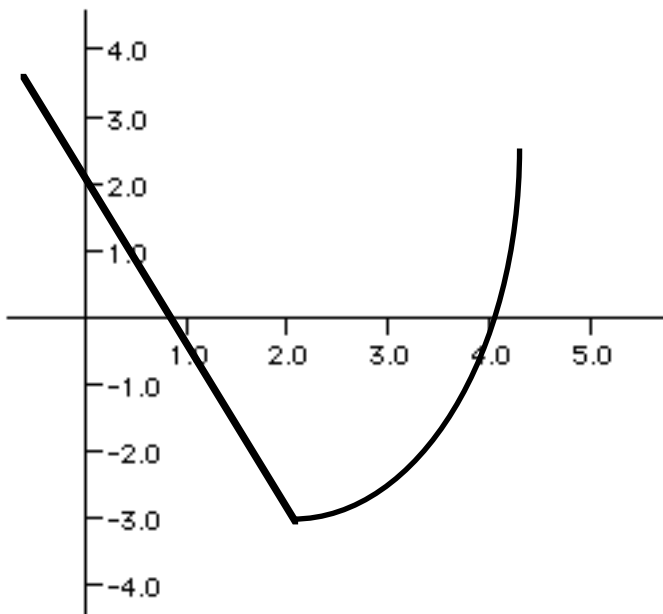
a. $\frac{x}{x - y}$

b. $\frac{y + x}{y - x}$

c. 1

d. $\frac{-x}{y}$

e. None of these



4. Use the graph of $f(x)$ above to estimate $\lim_{x \rightarrow 2} f(x)$

a. Does not exist

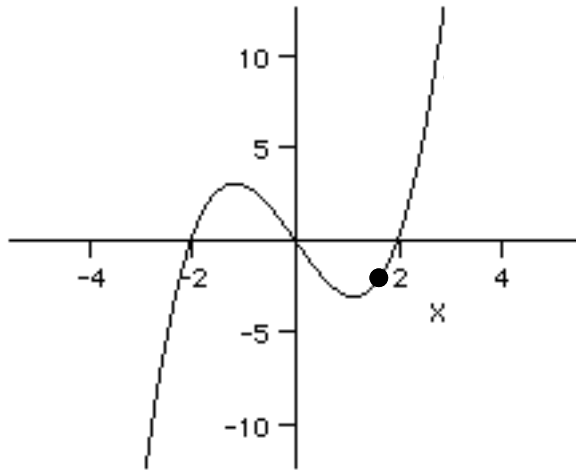
b. 0

c. -3

d. 2

e. None of these

5. Determine whether the slope at the indicated point is



- a. Positive b. Zero c. Negative d. No Slope e. None of these

6. Find $\lim_{x \rightarrow 1} \frac{5}{(x-1)^2}$

- a. 0 b. $-\infty$ c. $\frac{5}{4}$ d. ∞ e. None of these

7. Find $f'(x)$: $f(x) = \frac{x^2 - 3x}{x^2}$

- a. $\frac{2x-3}{x^2}$ b. $\frac{2x-3}{2x}$ c. $1 - \frac{3}{x}$ d. $\frac{3}{x^2}$ e. None of these

8. Find $\lim_{x \rightarrow -1} \frac{x^2 + 2x + 3}{x^2 + 1}$

- a. 0 b. 1 c. ∞ d. Does not exist e. None of these

9. If $f(x) = -x^2 + x$, which of the following will calculate the derivative of $f(x)$?

- a. $\lim_{\Delta x \rightarrow 0} \frac{(-x^2 + x + \Delta x) - (-x^2 + x)}{\Delta x} = -x^2 + x$ b. $\lim_{\Delta x \rightarrow 0} \frac{[-(x + \Delta x)^2 + (x + \Delta x)] - (-x^2 + x)}{\Delta x}$
- c. $\frac{[-(x + \Delta x)^2 + (x + \Delta x)] - (-x^2 + x)}{\Delta x}$ d. $\frac{(-x^2 + x + \Delta x) - (-x^2 + x)}{\Delta x}$ e. None of these

10. Find $\lim_{x \rightarrow 5} \frac{x^2 - 3x - 10}{x - 5}$

- a. 2 b. Does not exist c. 0 d. 7 e. None of these

11. If $f(x) = \sin(2x)$, find $f''(x)$

- a. $2\cos(2x)$ b. $-4\sin(2x)$ c. $-2\sin(2x)$ d. $-4\sin x$ e. None of these

12. If $f(x) = \begin{cases} x^2 + 3x - 1, & x \leq 2 \\ -3bx + 3, & x < 2 \end{cases}$, find the value of b in order for f to be continuous.

- a. -1 b. -2 c. 2 d. 1 e. None of these

13. For which of these functions $f(x)$ does $\lim_{x \rightarrow -\infty} f(x) = 2$?

- a. $\frac{x-2}{3x-5}$ b. $\frac{2x}{\sqrt{x-2}}$ c. $\frac{2x^2 - 6x + 1}{1+x^2}$ d. $\frac{2x-1}{x^2+1}$ e. None of these

14. Find an equation of the tangent line to the graph of $f(x) = x \sin x$ when $x = 0$.

- a. $y = 0$ b. $f'(x) = 0$ c. $y = x \cos x + \sin x$ d. $y = x$ e. None of these

15. Find $\frac{dy}{dx}$ for $y = \sin(x + y)$

- a. 0 b. $\frac{\cos(x+y)}{1-\cos(x+y)}$ c. $\cos(x+y)$ d. 1 e. None of these

16. Find $\frac{d^2y}{dx^2}$ for $y = \frac{x+3}{x-1}$

- a. 0 b. $y = \frac{-8}{(x-1)^3}$ c. $y = \frac{-4}{(x-1)^3}$ d. $y = \frac{8}{(x-1)^3}$ e. None of these

17. Which of the following describes the graph of $y = |2x + 6|$?

- a. only continuous b. only differentiable c. both a and b
d. not continuous, not differentiable e. constant

18. Find $f'(x)$ if $f(x) = \sin^3 4x$

- a. $4\cos^3 4x$ b. $3\sin^2 4x \cos 4x$ c. $\cos^3 4x$ d. $12\sin^2 4x \cos 4x$ e. None of these

19. If $f(1) = 4$ and $f'(1) = 2$, find an equation of the tangent line at $x = 1$.

- a. $y = 2x + 2$ b. $y = 2x - 2$ c. $y = 4x - 7$ d. $y = 4x - 2$ e. None of these

20. Find the equation of the line that passes through $(1, 3)$ and is perpendicular to the line $2x + 3y + 5 = 0$,

- a. $3x - 2y + 3 = 0$ b. $2x + 3y - 11 = 0$ c. $2x + 3y - 9 = 0$ d. $3x - 2y - 7 = 0$ e. None of these

21. Find an equation of the tangent line to the graph of $x^2 + 3y^2 = 4$ at the point $(1, 1)$

- a. $y + 1 = \frac{-1}{3}(x + 1)$ b. $y - 1 = \frac{-x}{3y}(x - 1)$ c. $x + 3y = 2$
d. $y - 1 = \frac{-1}{3}(x - 1)$ e. None of these

22. Find the derivative of $x^2 f(x)$

a. $x[xf'(x) + 2f(x)]$

b. $2xf'(x)$

c. $x[xf(x) + 2f'(x)]$

d. $x^2 f'(x)$

e. None of these

23. Let $f(7) = 0$, $f'(7) = 14$, $g(7) = 1$, $g'(7) = \frac{1}{7}$. Find $h'(7)$ if $h(x) = \frac{f(x)}{g(x)}$

a. 98

b. -14

c. -2

d. 14

e. None of these

24. Which of the following functions does **not** have a derivative of 0?

a. $y = \frac{-1}{1000}$

b. $y = 4\pi^2 - 9$

c. $y = \sin^2 x + \cos^2 x$

d. $y = \csc x \tan x \cos x$

e. All do

25. Find $\lim_{x \rightarrow 0} \frac{\sqrt{x+9} - 3}{x}$

a. 0

b. 1

c. ∞

d. $\frac{1}{3}$

e. None of these

26. Find all points on the graph of $f(x) = -x^3 + 3x^2 - 2$ where there is a horizontal tangent line.

a. (0, -2), (2, 2)

b. (0, -2)

c. (1, 0), (0, -2)

d. (2, 2)

e. None of these

27. If $f(x) = x^2 + 1$ and $g(x) = 2x - 1$, find $f'(g(x))$ at $x = 1$.

a. 2

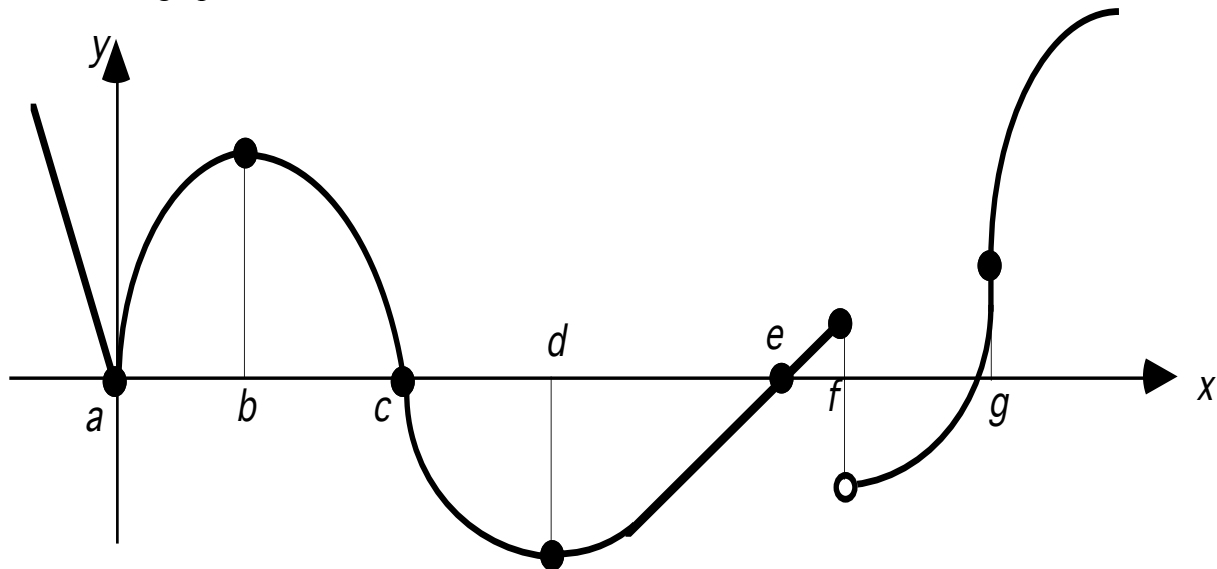
b. 6

c. 4

d. 0

e. None of these

28. Use the graph below to determine all x -values at which the function is **not** differentiable.

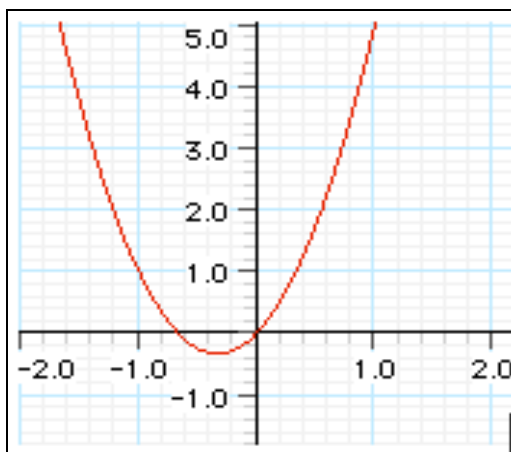


- a. a, b, c, d, e, f, g b. b and d c. a and f d. $a, f,$ and g e. only f

29. Find the derivative: $f(x) = \frac{1}{\sqrt[3]{3-x^3}}$

- a. $\frac{-1}{3(3-x^3)^{4/3}}$ b. $\frac{x^2}{(3-x^3)^{4/3}}$ c. $\frac{-x^2}{(3-x^3)^{2/3}}$ d. $\frac{-x^2}{(3-x^3)^{4/3}}$ e. None of these

30. The graph below could represent the graph of the derivative of which of the following functions?



- a. a constant function b. a linear function c. a quadratic function
d. a cubic function e. None of these

Go back and make sure all your answers are clear and erasures are complete.