

Derivative Practice

Name: _____

Date: _____

1. If $f(x) = \sqrt{x+2}$, then which one of the following is equal to $f'(x)$?

- A. $\lim_{h \rightarrow 0} \frac{\sqrt{x+h+2} - \sqrt{x+2}}{2}$ B. $\lim_{h \rightarrow 0} \frac{\sqrt{x+h+2} - \sqrt{x+2}}{h}$
 C. $\lim_{x \rightarrow 2} \frac{\sqrt{x+2} - \sqrt{h+2}}{h}$ D. $\lim_{x \rightarrow 2} \frac{\sqrt{x+h+2} - \sqrt{h}}{h}$

2. What is $\lim_{h \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$?

- A. $\frac{1}{\sqrt{x}}$ B. $\frac{1}{2\sqrt{x}}$ C. $2\sqrt{x}$ D. 0

3. What is $\lim_{h \rightarrow 0} \frac{\cos(x+h) - \cos x}{h}$?

- A. $\cos(x+h)$ B. $\frac{\cos x}{x}$ C. $\sin x$ D. $-\sin x$

4. What is $\lim_{h \rightarrow 0} \frac{\cos(\frac{\pi}{3}+h) - \cos(\frac{\pi}{3})}{h}$?

- A. $-\frac{1}{2}$ B. $\frac{1}{2}$ C. $\frac{\sqrt{3}}{2}$ D. $-\frac{\sqrt{3}}{2}$

5. f and g are differentiable functions and have the values shown in the table.

If $A = 3f + 2g$, then $A'(4) =$

- A. 44 B. 0
 C. 36 D. 35

x	f	f'	g	g'
0	5	1	-7	$\frac{1}{4}$
2	8	3	-5	1
4	14	9	-3	4
6	26	27	-1	16

6. The functions f and g are differentiable and have the values shown in the table.

If $A = f \cdot g$, then $A'(2) =$

- A. 0 B. 53 C. -7 D. 19

7. The functions f and g are differentiable and have the values shown in the table.

If $A = \left(\frac{1}{g}\right)$, then $A'(4) =$

- A. 0 B. $\frac{4}{9}$ C. $-\frac{4}{9}$ D. $-\frac{1}{4}$

8. The functions f and g are differentiable and have the values shown in the table.

If $A = \left(\frac{f}{g}\right)$, then $A'(4) =$

- A. $\frac{29}{9}$ B. $\frac{9}{4}$ C. $\frac{83}{9}$ D. $-\frac{83}{9}$

9. The functions f and g are differentiable and have the values shown in the table.

If $A = f(g(x))$, then $A'(-8) =$

- A. -72 B. 54
 C. 9 D. -9

x	f	f'	g	g'
-8	4	3	-2	6
-6	10	12	0	9
-2	20	9	6	18
2	30	15	12	24

10. f and g are differentiable functions and have the values shown in the table.

If $A = \sqrt{g(x)}$, then $A'(-2) =$

- A. $\frac{9}{8}$ B. impossible
 C. $\frac{3}{2}$ D. 6

x	f	f'	g	g'
-8	4	3	-2	6
-6	10	12	0	9
-2	16	9	36	18
2	30	15	52	24

11. The functions f and g are differentiable and have the values shown in the table.

If $A = f(x^3)$, then $A'(-2) =$

- A. -18 B. 9
 C. -120 D. 36

x	f	f'	g	g'
-8	4	3	-2	6
-6	10	12	0	9
-2	16	9	6	18
2	30	15	12	24

12. If $f(x) = \cos^4 x$, then $f'(\frac{\pi}{3}) =$

- A. $-\frac{\sqrt{3}}{4}$ B. $\frac{1}{2}$ C. $\frac{4}{\sqrt{3}}$ D. $\frac{\sqrt{3}}{2}$

13. Differentiate: $\frac{1 + \cos x}{1 - \cos x}$

- A. -1 B. $2 \csc x$
 C. $\frac{-2 \sin x}{(1 - \cos x)^2}$ D. $\frac{-\sin^2 x}{(1 + \cos x)^2}$

14. Find the derivative, $\frac{dy}{dx}$, of $y = \frac{2x}{1-3x^2}$.
- A. $-\frac{1}{3x}$ B. $-\frac{12x}{(1-3x^2)^2}$
 C. $\frac{6x^2+2}{(1-3x^2)^2}$ D. $\frac{2x}{3(1-3x^2)^2}$
15. Find the derivative, $\frac{dy}{dx}$, of $f(x) = \frac{x^2-1}{x^2+1}$.
- A. $\frac{4x}{(x^2+1)^2}$ B. 1 C. $-\frac{4x}{(x^2+1)^2}$ D. $\frac{-4x^2-4x}{(x^2+1)^2}$
16. If $y = \frac{-4}{\sqrt[3]{x+5}}$, then $\frac{dy}{dx} =$
- A. $\frac{4}{3\sqrt[3]{(x+5)^4}}$ B. $\frac{8}{\sqrt[3]{(x+5)^5}}$
 C. $\frac{-1}{\sqrt[3]{(x+5)^4}}$ D. $\frac{-1}{3(x+5)^{4/3}}$
17. Find an equation for the tangent line to the graph of $f(x) = \sqrt{x-7}$ at the point where $x = 16$.
- A. $x - 6y = -2$ B. $x + 6y = 2$
 C. $x - 6y = 2$ D. $6x + y = -2$
18. If $f(x) = x^2 - 10$, find an equation of the tangent to the curve passing through the point $(5, 1)$.
- A. $y - 1 = -10(x - 5)$ B. $y + 5 = -10(x + 1)$
 C. $y - 1 = 10(x - 5)$ D. $y - 5 = 10(x - 1)$
19. Find the slope of the tangent line to the graph of $f(x) = -3x^2(x^2 + 2)$ at the point where $x = -1$.
- A. 6 B. -6 C. 0 D. 24
20. Find an equation of the tangent line to the graph of $f(x) = \frac{(x-3)}{(x+3)}$ when $x = -2$.
- A. $y + 5 = 6(x + 2)$ B. $y - 5 = -6(x - 2)$
 C. $y + 5 = -6(x - 2)$ D. $y - 5 = 3(x + 2)$
21. Find the slope of the tangent to the graph $f(x) = \frac{\cos x}{\sin 2x}$ where $x = \frac{\pi}{6}$.
- A. $4\sqrt{3}$ B. $\sqrt{3}$ C. $-\sqrt{3}$ D. $3\sqrt{3}$
22. If $f(x) = (x - 8)^{1/3} + 5$, then the x -value of a vertical tangent is
- A. $-\sqrt[3]{8}$ B. 2 C. $\sqrt{2}$ D. 8
23. Write the equation of the tangent line to the graph of $f(x) = x^4 - 7x^2 + 12$ at the point where $x = 1$.
- A. $10x + 2y - 5 = 0$ B. $10x + y - 16 = 0$
 C. $5x + y - 8 = 0$ D. $2x + 10y - 16 = 0$
24. If $f(x) = x \cos x$, determine the equation of the tangent line to the graph when $x = \pi$.
- A. $y + 1 = -(x - \pi)$ B. $y + 1 = x - \pi$
 C. $y = x$ D. $y = -x$
25. Find $D_x^2 y$ for $y = \frac{x+2}{x-3}$.
- A. $\frac{10}{(x-3)^3}$ B. $\frac{-10}{(x-3)^3}$ C. $\frac{2}{(x-3)^3}$ D. $\frac{18}{(x-3)^2}$
26. If $y = 4 \cos \frac{x}{6}$, then $\frac{d^2 y}{dx^2} =$
- A. $\sin \frac{x}{6} \cos^2 \frac{x}{6}$ B. $\frac{\cos \frac{x}{6}}{9}$
 C. $-\frac{\cos \frac{x}{6}}{9}$ D. $\tan \frac{x}{6}$
27. Find the derivative of $y = (x^2 + 2x + 5)^6$.
- A. $6(2x + 2)(x^2 + 2x + 5)^5$ B. $(12x + 1)(x^2 + 2x + 5)^5$
 C. $6(x^2 + 2x + 5)^5$ D. $\frac{6(2x + 2)}{x^2 + 2x + 5}$
28. Find $\frac{dy}{dx}$ for $y = x^3 \sqrt{x+1}$.
- A. $\frac{x^2(7x+6)}{2\sqrt{x+1}}$ B. $\frac{7x^3+x^2}{2\sqrt{x+1}}$ C. $3x^2\sqrt{x+1}$ D. $\frac{x^2\sqrt{x+1}}{\sqrt{x^6+1}}$
29. If $y = (2x^2 - 3)^4(x - 4)^5$, then $\frac{dy}{dx} =$
- A. $5(x - 4)^4(2x^2 - 3)^3$
 B. $(26x^2 - 64x - 15)(x - 4)^4(2x^2 - 3)^3$
 C. $32(x - 4)^4(2x^2 - 3)^3(26x^2 - 64x - 15)$
 D. $26(x - 4)^4(2x^2 - 3)^3(2x + 24)$

30. Find the derivative: $s(t) = \sin(\frac{t}{2})$

- A. $-\cos(\frac{t}{2})$ B. $2\cos(\frac{t}{2})$ C. $\frac{1}{2}\cos(\frac{t}{2})$ D. $-\frac{1}{2}\cos(\frac{t}{2})$

31. Differentiate: $s(t) = \sec \sqrt{t}$

- A. $\tan^2 \sqrt{t}$ B. $\frac{\sec \sqrt{t} \cdot \tan \sqrt{t}}{2\sqrt{t}}$
C. $\sec \frac{1}{2\sqrt{t}} \cdot \tan \frac{1}{2\sqrt{t}}$ D. $\frac{\csc \sqrt{t}}{\sqrt{t}}$

32. Find $\frac{dy}{dx}$ if $y = \cos^2 x - \sin^2 x$.

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

33. Differentiate: $y = \sec^2 x + \tan^2 x$

- A. 0 B. $\sec^2 x(\sec^2 x + \tan^2 x)$
C. $4 \sec^2 x \tan x$ D. $2 \sec x \csc x + 2$

34. If $y = \sin(\sin x)$, then $\frac{dy}{dx} =$

- A. $\cos^2(\sin x)$ B. $\cos x \cos(\sin x)$
C. $1 - \sin^3 x$ D. $\cos 3x$

35. If $y = \sin^2(x^3)$, then $\frac{dy}{dx} =$

- A. $\sin x^3 \cos x^3$ B. $6x^2 \sin x^3 \cos x^3$
C. $6x^2 \sin(\cos x^3)$ D. $6x^2 \sin x^3 \cos x$

36. If $y = -3(\cos^2 x + \sin^2 x)^4$, then the first derivative of y is

- A. $-12(\cos^2 x + \sin^2 x)^3$
B. $12(\cos^2 x + \sin^2 x)^3(2 \cos x + 2 \sin x)$
C. $-12 \cos 4x$
D. 0

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|---------|---|---------|---|
| 1. | | 21. | |
| Answer: | B | Answer: | C |
| 2. | | 22. | |
| Answer: | B | Answer: | D |
| 3. | | 23. | |
| Answer: | D | Answer: | B |
| 4. | | 24. | |
| Answer: | D | Answer: | D |
| 5. | | 25. | |
| Answer: | D | Answer: | A |
| 6. | | 26. | |
| Answer: | C | Answer: | C |
| 7. | | 27. | |
| Answer: | C | Answer: | A |
| 8. | | 28. | |
| Answer: | D | Answer: | A |
| 9. | | 29. | |
| Answer: | B | Answer: | B |
| 10. | | 30. | |
| Answer: | C | Answer: | C |
| 11. | | 31. | |
| Answer: | D | Answer: | B |
| 12. | | 32. | |
| Answer: | A | Answer: | A |
| 13. | | 33. | |
| Answer: | C | Answer: | C |
| 14. | | 34. | |
| Answer: | C | Answer: | B |
| 15. | | 35. | |
| Answer: | A | Answer: | B |
| 16. | | 36. | |
| Answer: | A | Answer: | D |
| 17. | | | |
| Answer: | A | | |
| 18. | | | |
| Answer: | C | | |
| 19. | | | |
| Answer: | D | | |
| 20. | | | |
| Answer: | A | | |