



Name: _____

Date: _____

1. If $f(x) = \sqrt{x-5}$, then which one of the following is equal to $f'(x)$?

A. $\lim_{h \rightarrow 0} \frac{\sqrt{x+h-5} - \sqrt{x-5}}{5}$

B. $\lim_{h \rightarrow 0} \frac{\sqrt{x+h-5} - \sqrt{x-5}}{h}$

C. $\lim_{x \rightarrow 5} \frac{\sqrt{x-5} - \sqrt{h-5}}{h}$

D. $\lim_{x \rightarrow 5} \frac{\sqrt{x+h-5} - \sqrt{h}}{h}$

2. If $f(x) = 5x^3$, then $f'(2) =$

A. 30 B. 10 C. 60 D. $15x^2$

3. If $f(x) = \tan x$, then $f'(\frac{\pi}{3}) =$

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

4. If $f(x) = \sin x \cos x$, then $f'(\frac{\pi}{6}) =$

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

5. Given $f(x) = \frac{x}{\tan x}$, find $f'(\frac{3\pi}{4})$.

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

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

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

7. 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. $\frac{2x}{3(1 - 3x^2)^2}$

8. Assume $f(7) = 0$, $f'(7) = 14$, $g(7) = 1$, and $g'(7) = \frac{1}{7}$. Find $h'(7)$ given $h(x) = \frac{f(x)}{g(x)}$.

A. -2 B. 14 C. $\frac{49}{2}$ D. 98

9. 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. $\frac{1}{4}$

D. $-\frac{1}{4}$

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

10. 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. $\frac{2x + 2}{(x^2 + 2x + 5)^6}$

D. $\frac{6(2x + 2)}{x^2 + 2x + 5}$

11. 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. 0
B. $\frac{29}{9}$
C. $\frac{9}{4}$
D. $-\frac{83}{9}$

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

12. Find the derivative: $s(t) = \cos(\frac{t}{3})$

- A. $3 \sin(\frac{t}{3})$
B. $\frac{1}{3} \csc(\frac{t}{3}) \cot(\frac{t}{3})$
C. $\frac{1}{3} \sin(\frac{t}{3})$
D. $-\frac{1}{3} \sin(\frac{t}{3})$

13. 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

14. Find the derivative of $y = \sqrt[3]{x^2 + x}$.

- A. $\frac{1}{3}(x^2 + x)^{-2/3}(2x + 1)$
B. $\frac{2}{3}(x^2 + x)^{-2/3}(2x - 1)$
C. $\frac{x}{3}(x + 1)^{-2/3}(2x + 1)$
D. $\frac{1}{3}(x^2 + x)^{2/3}(2x + 1)$

15. Find $\frac{dy}{dx}$ for $y = x^3\sqrt{2x+1}$

- A. $\frac{x^2(7x+3)}{\sqrt{2x+1}}$
B. $\frac{3x^2}{2\sqrt{2x+1}}$
C. $\frac{8x^3+3x^2}{2\sqrt{2x^4+x^3}}$
D. $\frac{6x^3+3}{\sqrt{2x+1}}$

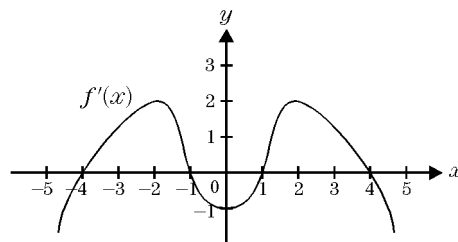
16. $\frac{d}{da} \left(\frac{5}{(a^2-2)^4} \right) =$

- A. $\frac{-40a}{(a^2-2)^3}$
B. $\frac{-40a}{(a^2-2)^5}$
C. $\frac{-20}{(a^2-2)^5}$
D. $\frac{20a^2}{(a^2-2)^3}$

17. If $y = \frac{(4x-3)^2}{\sqrt{x}}$, then $\frac{dy}{dx} =$

- A. $\frac{3(4x-3)}{2\sqrt{x^3}}$
B. $\frac{9(4x-3)}{2x^{1/2}}$
C. $\frac{3(4x-3)(4x+1)}{2x^{3/2}}$
D. $3(4x-3)x^{-3/2}$

18. The graph $f(x)$ has horizontal tangents when $x =$



- A. -2, 0, 2
B. -2, 2
C. -1, 2
D. -4, -1, 1, 4

19. Find the derivative of $y = \cos x^3$.

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

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

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

21. If $y = \sin(\cos x)$, then $\frac{dy}{dx} =$
- A. $\sin x \cos(\sin x)$ B. $-\sin x \cos(\cos x)$
 C. $3x^2 \sin x^3$ D. $6x^2 \sin x^3 \cos x$
22. 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. $6x - y = 2$
 C. $x - 6y = 2$ D. $6x + y = -2$
23. The point $\left(1, \frac{4}{3}\right)$ lies on the graph of $f(x) = \frac{x+3}{x+2}$. Find the slope of a line tangent to the graph at that point.
- A. $-\frac{5}{9}$ B. $-\frac{1}{9}$ C. $\frac{1}{9}$ D. $\frac{3}{2}$
24. The graph of $f(x) = \frac{3x^2}{16-x^2}$ has a horizontal tangent at $y =$
- A. -3 B. 3 C. 4 D. 0
25. Given a function defined by $f(x) = (x)^{1/3}(4-x)$, for what value(s) of x does the function have one or more vertical tangents?
- A. -2 only B. 0 only
 C. 4 only D. $2, -4$