

Name: _____

Practice Unit 1

Find the average rate of change of y with respect to x over the given interval. Show your work!!

1. $y = x^3 - 1$ $[-2, 3]$

2. $f(x) = \frac{1}{x}$ $[-3, -1]$

3. A table of values for a function $f(x)$ is written below. Find an approximation for $f'(9)$. Show how you got your answer!!

x	3	5	9	14
$f(x)$	-8	12	-1	15

Use the definition of the derivative $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to find $f'(x)$. Show all work!!

4. $f(x) = \frac{1}{x^2}$

5. $f(x) = \frac{3}{x-2}$

Find each derivative using derivative rules:

6. $y = \frac{x^4 - 1}{x}$

7. $f(x) = (4x - 2x^2)(3x - 5)$

8. $f(x) = \frac{5x + 2}{x^2 - 1}$

9. $f(x) = \sqrt{3 + \sin^2(4x)}$

10. $f(x) = (3x - 2)^5(x^2 - 1)$

11. $y = 10 \cos[\sin(x^2 - 4)]$

12. $y = 10 \cot(2x - 1)$

13. $y = \sqrt{\frac{x}{4x - 1}}$

14. $f(x) = (\sqrt{x^3 + 2} + 2x)^{-2}$

15. $y = \frac{x^3}{(x^2 + 4)^2}$

16. Find the equation of the line that is tangent to $y = 2x \sin x$ at $x = \frac{\pi}{4}$.

17. Find the equation of the line that is tangent $y = \sqrt{x^2 + 16}$ at $x = 3$

18. Let f be the function defined by $f(x) = \begin{cases} k\sqrt{x+1}, & f, & 0 \leq x \leq 2 \\ mx+2, & f, & 3 < x \leq 5 \end{cases}$, where k and m are constants. If f is differentiable at $x = 3$, what are the values of k and m ?

Suppose that functions f and g and their derivatives have the following values at $x = 0$ and $x = 1$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
0	1	1	5	1/3
1	3	-4	-1/3	-8/3

19. If $h(x) = f(x)g(x)$, find $h'(0)$

20. If $k(x) = 2f(x) + g(x)$, find $k'(0)$

21. If $j(x) = \frac{f(x)}{g(x)}$, find $j'(1)$

Suppose that functions f and g and their derivatives have the following values at $x = 2$ and $x = 3$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
2	5	3	2	1
3	4	-1	-3	6

22. If $h(x) = f(g(x))$, find $h'(2)$

23. If $k(x) = f(x) \cdot g(x)$, find $k'(3)$

24. If $j(x) = \sqrt{f(x)}$, find $j'(2)$