

Derivative Review Worksheet 1 (NO CALCULATOR)

Show all your work with proper notations.

Use the limit definition of derivative to find the derivatives.

1. $f(x) = 2x^2 + 1$

2. $g(x) = x^3 + 1$

3. $y = 3x - 4$

4. $y = \frac{2}{x+4}$

Find the derivative of each function below. Leave your answer in SIMPLIFIED or SIMPLIFIED FACTORED form.

5. $y = \frac{2-x}{3x+1}$

6. $y = \sqrt{3-2x}$

7. $y = \frac{2}{(5x+1)^3}$

8. $y = 3x^{2/3} - 4x^{1/2} - 2$

9. $y = 2\sqrt{x} - \frac{1}{2\sqrt{x}}$

10. $y = \frac{x}{\sqrt{1-x^2}}$

11. $y = (4x+1)^2(1-x)^3$

12. $y = \frac{1}{x}$; find $y^{(4)}(1)$.

13. $y = \sqrt{x^2 + 2x - 5}$

14. $y = 5$

15. $f(x) = x\sqrt{x}$

16. $f(x) = \frac{x-1}{\sqrt{2x}}$

17. $y = (x^2 - 2)(x^{-1} + 2)$	18. $y = \left(\frac{x}{x^2-1}\right)^{-1}$	19. $y = 3x^2 + \frac{2}{x} - \frac{5}{x^2}$
20. $y = \frac{x^{-4}}{5} - \frac{x^{-2}}{2} + x^{-1} + 4$	21. $f(x) = \left(\frac{x-1}{x+1}\right)^3$	22. $f(x) = x^4 - 4x^2$. Find $f'''(2)$.
Answer each question below.		
23. $y = 2x^3 - 3x^2 - 12x + 20$ Find the point(s) on the curve where the tangent is parallel to the x -axis.	24. Find the x - and y - intercepts of the line that is tangent to the curve $y = x^3$ at the point where $x = -2$.	
25. If the line $-4x + y = 2$ is tangent to the curve $y = \frac{1}{3}x^3 + c$, find c .	26. Find the slope of the normal to $f(x) = 2x^3 + x^2 + 1$ at the point where $x = \frac{1}{2}$.	

<p>27. Find the equation of the tangent to $y = \sqrt{x^3 + 1}$ at the point where $x = -1$.</p>	<p>28. Graph the function $g(x) = \frac{1}{x-2}$, then find and graph the tangent at the point $(3, f(3))$.</p>
<p>29. Find $\frac{dy}{dx}$ for $y = (x^2 + 1)(x^3 + 1)$, then find the slope of the normal when $x = -1$.</p>	<p>30. Graph the function $y = 2x^2 + 4x - 1$, then find and graph the tangent at the point $(1, f(1))$.</p>
<p>31. If the line $2x - y = 3$ is tangent to the function $f(x) = x^2 + 2x - 3$, what is the point of tangency?</p>	<p>32. If the slope of a tangent line is 5, then what is the slope of the normal line to the same curve at the same time?</p>
<p>33. At what x-value is $y = 3x - 1$ tangent to $f(x) = x^3 + 1$?</p>	<p>34. Find the equation of the normal line to the curve $f(x) = \left(\frac{x-1}{x+1}\right)^{-2}$ at the point where $x = 2$.</p>

Answers:

(Let me know if you see typos)

1. $f'(x) = 4x$; show with definition of derivative	2. $g'(x) = 3x^2$; show with definition of derivative	3. $f'(x) = 3$; show with definition of derivative	4. $f'(x) =$ $-\frac{2}{(x+4)^2}$; show with definition of derivative	5. $-\frac{7}{(3x+1)^2}$
6. $-\frac{1}{\sqrt{3-2x}}$	7. $-\frac{30}{(5x+1)^4}$	8. $2x^{-1/3} - 2x^{-1/2}$		9. $\frac{4x+1}{4x\sqrt{x}}$
10. $\frac{1}{\sqrt{(1-x^2)^3}}$	11. $5(4x+1)(1-4x)(1-x)^2$		12. 24	13. $\frac{x+1}{\sqrt{x^2+2x-5}}$
14. 0	15. $\frac{3}{2}x^{1/2}$	16. $\frac{x+1}{\sqrt{(2x)^3}}$	17. $4x + 2x^{-2} +$ 1	18. $\frac{x^2+1}{x^2}$
19. $6x - \frac{2}{x^2} + \frac{10}{x^3}$	20. $-\frac{4}{5}x^{-5} + x^{-3} - x^{-2}$		21. $\frac{6(x-1)^2}{(x+1)^4}$	22. 48
23. $x = -1, 2$	24. $(-\frac{4}{3}, 0), (0, 16)$	25. $\frac{22}{3}, -\frac{10}{3}$	26. $-\frac{2}{5}$	27. $x = -1$
28. $y = -x + 4$; Graph	29. $5x^4 + 3x^2 + 2x$; $-\frac{1}{6}$		30. $y = 8x - 3$; Graph	31. $(0, -3)$
32. $-\frac{1}{5}$	33. $x = 1$ only	34. $y - 9 = \frac{1}{12}(x - 2)$		