

Derivatives: Polynomials & Exponential Functions

 Rewrite

 derivative

1-21: Differentiate the Function

1. $f(x) = e^5$	2. $f(t) = 2 - \frac{2}{3}t$	3. $F(x) = \frac{3}{4}x^8$
4. $h(x) = (x-2)(2x+3)$	5. $g(t) = 2t^{-\frac{3}{4}}$	6. $A(s) = -\frac{12}{s^5}$
7. $y = x^{\frac{5}{3}} - x^{\frac{2}{3}}$	8. $h(t) = \sqrt[4]{t} - 4e^t$	9. $\sqrt{x}(x-1)$
10. $3e^x + \frac{4}{\sqrt[3]{x}}$	11. $y = \frac{x^2 + 4x + 3}{\sqrt{x}} = \frac{x^{4/2} + 4x^{3/2} + 3}{x^{1/2}} = \frac{3}{x^{1/2}} + \frac{4x^{3/2}}{x^{1/2}} + \frac{x^{4/2}}{x^{1/2}}$ $y = 3x^{-1/2} + 4x^{1/2} + x^{3/2}$ $y' = \frac{3}{2}x^{-3/2} + 2x^{-1/2} + \frac{3}{2}x^{1/2}$	12. $y = \frac{\sqrt{x} + x}{x^2} = \frac{x^{1/2}}{x^2} + \frac{x}{x^2}$ $y = x^{-3/2} + x^{-1}$ $y' = -\frac{3}{2}x^{-5/2} - x^{-2}$
13. $k(r) = e^r + r^e$	14. $f(x) = x^3 - 4x + 6$	15. $f(t) = 1.4t^5 - 2.5t^2 + 6.7$
16. $g(x) = x^2(1-2x)$	17. $S(p) = \sqrt{p} - p$	18. $S(R) = 4\pi R^2$
19. $y = x^8 + 12x^5 - 4x^4 - 6x + 5$	20. $y = \frac{3x^2 - \sqrt{x} + x}{x}$	21. $u = \sqrt[5]{t} + 4\sqrt{t^5}$

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22-24: Find an equation of the tangent line to the curve at the given point.

22. $f(x) = 2x^3 + 6$, $(-1, 4)$

23. $y = \sqrt[4]{x}$, $(1, 1)$

Tangent line $x=1$

[1] $y(1) = 1$

[2] slope $y'(1) = \frac{1}{4(1)} = \frac{1}{4}$

$y = x^{1/4}$

$y'(x) = \frac{1}{4}x^{-3/4}$

$y'(x) = \frac{1}{4(\sqrt[4]{x})^3}$

$y - 1 = \frac{1}{4}(x - 1)$

24. $y = x^4 + 2x^2 - x$, $(1, 2)$

Answers:

1.) $f'(x) = 0$

2.) $f'(t) = -\frac{2}{3}$

3.) $F'(x) = 6x^7$

4.) $h'(x) = 4x - 1$

5.) $g'(t) = -\frac{3}{2}t^{-7/4}$

6.) $A'(s) = 60s^{-6} = \frac{60}{s^6}$

7.) $y' = \frac{5}{3}x^{2/3} - \frac{2}{3}x^{-1/3}$

8.) $h'(t) = \frac{1}{4}t^{-3/4} - 4e^t$

9.) $\frac{3}{2}x^{1/2} - \frac{1}{2}x^{-1/2}$

10.) $3e^x - \frac{4}{3}x^{-4/3}$

11.) $y' = \frac{3}{2}x^{1/2} + 2x^{-1/2} - \frac{3}{2}x^{-3/2}$

12.) $y' = -\frac{3}{2}x^{-5/2} - x^{-2}$

13.) $k'(r) = e^r + e \cdot r^{e-1}$

14.) $f'(x) = 3x^2 - 4$

15.) $f'(t) = 7t^4 - 5t$

16.) $g'(x) = 2x - 6x^2$

17.) $s'(p) = \frac{1}{2}p^{-1/2} - 1$

18.) $s'(r) = 8\pi r$

19.) $y' = 8x^7 + 60x^4 - 16x^3 - 6$

20.) $y' = 3 + \frac{1}{2}x^{-3/2}$

21.) $u' = \frac{1}{5}t^{-4/5} + 10t^{3/2}$

22.) $y - 4 = 6(x + 1)$

23.) $y - 1 = \frac{1}{4}(x - 1)$

24.) $y - 2 = 7(x - 1)$