

Differentiation Practice KEY

function	altered function	derivative by rule	simplified
1. $y = 3x^5$	=	$\frac{dy}{dx} =$	$= 15x^4$
2. $y = 6x^4$	=	$\frac{dy}{dx} =$	$= 24x^3$
3. $y = 6\sqrt{x}$	$= 6x^{1/2}$	$\frac{dy}{dx} = 3x^{-1/2}$	$= \frac{3}{\sqrt{x}}$
4. $y = 12\sqrt{x^3}$	$= 12x^{3/2}$	$\frac{dy}{dx} = 18x^{1/2}$	$= 18\sqrt{x}$
5. $y = \frac{3}{x}$	$= 3x^{-1}$	$\frac{dy}{dx} = -3x^{-2}$	$= \frac{-3}{x^2}$
6. $y = \frac{4}{x^3}$	$= 4x^{-3}$	$\frac{dy}{dx} = -12x^{-4}$	$= \frac{-12}{x^4}$
7. $y = \frac{4}{\sqrt{x}}$	$= 4x^{-1/2}$	$\frac{dy}{dx} = -2x^{-3/2}$	$= \frac{-2}{\sqrt{x^3}}$
8. $y = \frac{6}{\sqrt{x^3}}$	$= 6x^{-3/2}$	$\frac{dy}{dx} = -9x^{-5/2}$	$= \frac{-9}{\sqrt{x^5}}$
9. $y = \frac{x^3}{2}$	$= (1/2)x^3$	$\frac{dy}{dx} = \frac{3}{2}x^2$	$= \frac{3x^2}{2}$
10. $y = \frac{2x^3}{3}$	$= (2/3)x^3$	$\frac{dy}{dx} =$	$= 2x^2$
11. $y = 2(x+1)^3$	=	$\frac{dy}{dx} =$	$= 6(x+1)^2$
12. $y = 3(2x-1)^4$	=	$\frac{dy}{dx} = 12(2x-1)^3(2)$	$= 24(2x-1)^3$
13. $y = \frac{4}{(3x+1)^2}$	$= 4(3x+1)^{-2}$	$\frac{dy}{dx} = (-8)(3x+1)^{-3}(3)$	$= \frac{-24}{(3x+1)^3}$
14. $y = \frac{2}{(3-x)^4}$	$= 2(3-x)^{-4}$	$\frac{dy}{dx} = (-8)(3-x)^{-5}(-1)$	$= \frac{8}{(3-x)^5}$
15. $y = 5\sqrt{2x+3}$	$= 5(2x+3)^{1/2}$	$\frac{dy}{dx} = 5(1/2)(2x+3)^{-1/2}(2)$	$= \frac{5}{\sqrt{2x+3}}$
16. $y = 3\sqrt{4x+3}^3$	$= 3(4x+3)^{3/2}$	$\frac{dy}{dx} = 3(3/2)(4x+3)^{1/2}(4)$	$= 18\sqrt{4x+3}$
17. $y = 3(x^3+1)^4$	=	$\frac{dy}{dx} = 12(x^3+1)^3(3x^2)$	$= 36x^2(x^3+1)^3$
18. $\frac{dy}{dx} = \frac{6}{3x+2}$		19. $\frac{dy}{dx} = \frac{16}{4x-1}$	
20. $\frac{dy}{dx} = \frac{18}{6x+5}$		21. $\frac{dy}{dx} = \frac{8x+3}{8}$	
22. $\frac{dy}{dx} = \frac{2x+5}{2}$		23. $\frac{dy}{dx} = 6e^{2x}$	
24. $\frac{dy}{dx} = \frac{1}{2}e^{x/4}$		25. $\frac{dy}{dx} = -9e^{-3x}$	
26. $\frac{dy}{dx} = -2e^{-x/2}$		27. $\frac{dy}{dx} = -6xe^{-x^2}$	
28. $\frac{dy}{dx} = \frac{e^x}{1+e^x}$			