

Practice Problems

Differentiate each of the following functions.

1. $f(x) = e^{x^2-3x+5}$

8. $f(x) = \frac{1}{2}xe^{2x} - \frac{1}{4}e^{2x}$

15. $f(x) = \ln(\tan x)$

2. $f(x) = \frac{x^2 - 5x + 6}{x - 3}$

9. $f(x) = x^3 + 3^x$

16. $f(x) = \ln\left(\frac{3 - \sin x}{3 + \sin x}\right)^4$

3. $f(x) = 2^{\sin x}$

10. $f(x) = \frac{e^x}{e^x + 1}$

17. $f(x) = \cos(5^{2x-3})$

4. $f(x) = \log_{10}(x^4 + 8x^2 + e)$

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

18. $f(x) = \frac{x^8}{\ln x}$

5. $f(x) = \sin(5^x)$

12. $f(x) = 2^{\ln x}$

19. $f(x) = e^{\sin x + \cos x}$

6. $f(x) = e^{-x}$

13. $f(x) = \tan x$

20. $f(x) = \tan(e^{-x})$

7. $f(x) = \frac{1}{2}(e^x - e^{-x})$

14. $f(x) = \frac{x}{x-1}$

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

Practice Problems - Answers

$$1.) f'(x) = (2x - 3)e^{x^2 - 3x + 5} \quad 2.) f'(x) = 1 \quad 3.) f'(x) = (\ln 2)(\cos x)2^{\sin x}$$

$$4.) f'(x) = \frac{4x^3 + 16x}{(x^4 + 8x^2 + e)\ln 10} \quad 5.) f'(x) = (\ln 5)(5^x)\cos(5^x) \quad 6.) f'(x) = -e^{-x}$$

$$7.) f'(x) = \frac{1}{2}(e^x + e^{-x}) \quad 8.) f'(x) = xe^{2x} \quad 9.) f'(x) = 3x^2 + 3^x(\ln 3)$$

$$10.) f'(x) = \frac{e^x}{(e^x + 1)^2} \quad 11.) f'(x) = \frac{7}{(x + 5)^2} \quad 12.) f'(x) = \left(\frac{\ln 2}{x}\right)2^{\ln x}$$

$$13.) f'(x) = \tan^2 x + 1 = \sec^2 x \quad 14.) f'(x) = -\frac{1}{(x - 1)^2} \quad 15.) f'(x) = \frac{\tan^2 x + 1}{\tan x} = \tan x + \frac{1}{\tan x}$$

$$16.) \text{ Note: it is easier if we re-write } f \text{ as } 4\ln(3 - \sin x) - 4\ln(3 + \sin x) \\ f'(x) = -4\cos x \left(\frac{1}{\sin x + 3} + \frac{1}{-\sin x + 3} \right)$$

$$17.) f'(x) = -2(\ln 5)(5^{2x-3})\sin(5^{2x-3}) \quad 18.) f'(x) = \frac{x^7(8\ln x - 1)}{\ln^2 x}$$

$$19.) f'(x) = e^{\cos x + \sin x}(\cos x - \sin x) \quad 20.) f'(x) = -e^{-x}(\tan^2(e^{-x}) + 1) \quad 21.) f'(x) = \frac{-2(\ln 2)2^x}{(2^x - 1)^2}$$