DIFFERENTIATION OF EXPONENTS AND LOGARITHMS

CANSU OLCE

A STAR MATHS (www.astarmaths.com.au)

1. $f(x) = \ln(x^2 + x)$
   $f'(x) = ?$

2. $f(x) = \dfrac{lnx}{x}$
   $f'(e) = ?$

3. $f(x) = \log_2(x - 4)$
   $f'(5) = ?$

4. $f(x) = ln^2(2x + 2)$
   $f'(1) = ?$

5. $f(x) = \ln\left(\dfrac{x+1}{x-1}\right)$
   $f'(x) = ?$

6. $f(x) = e^{\ln(4x+1)}$
   $f'(x) = ?$

7. $f(x) = 4^{2x+6}$
   $f'(x) = ?$

8. $f(x) = e^x + e^{-x}$
$f'(x) = ?$

9. $e^x \frac{d}{dx}(xe^{-x}) = ?$

10. $y = e^{sinx}$
Find $\frac{dy}{dx}$ when x=π

11. $4y - 6xy + 2x - 4 = 0$
$\frac{dy}{dx} = ?$

12. $F(x, y) = x^2 - y2 \quad + xy - 1$
$F'(-1, 0) = ?$

13. $y = f(x)$
$\frac{1}{x^2} + \frac{1}{y^2} = 1$
$\frac{dy}{dx} = ?$

14. $y = lnx$
$\frac{d^4y}{dx^4} = ?$

15. $y = \frac{1}{2x-1}$
Find $\frac{d^3y}{dx^3}$ when x=1.

16. $y = 2e^{-x}$
$\frac{d^{20}y}{dx^{20}} = ?$

17. $y = \ln(cosx)$
$f'(x) = ?$

18. $f(x) = (x^2)^{sinx}$
$f'\left(\frac{\pi}{2}\right) = ?$

19. $y = \sqrt{4 + lnx}$
$\frac{dy}{dx} = ?$

20. $f(x) = 3^{cosx}$
$f'(x) = f'\left(\frac{\pi}{2}\right) = ?$

21. $y = \log_2 x^2$
$\frac{dy}{dx} = ?$

22. $f(x) = 5^x - 8^x$
$f'(0) = ?$

23. $f(x) = \sqrt{e^x} \ln x^2$
$f'(1) = ?$

24. $f(x) = \log x^3$
$f'\left(\frac{1}{ln10}\right) = ?$

25. $f(x) = 5^{3x-3}$
$f'(a) = ln5^{375}$
a= ?

ANSWERS

1. $\frac{2x+1}{x^2+x}$
2. 0
3. $\log_2 e$
4. ln4
5. $\frac{2}{1-x^2}$
6. 4
7. $2^{4x+14}ln2$
8. $e^x - e^{-x}$
9. 1-x
10. -1
11. $\frac{4}{(2-3x)^2}$
12. -2
13. $-\frac{y^3}{x^3}$
14. $-6x^{-4}$
15. -48
16. $2e^{-x}$
17. -tanx
18. π
19. $\frac{1}{2x\sqrt{4+lnx}}$
20. -ln3
21. $\frac{2}{xln2}$
22. $ln\frac{5}{8}$
23. $2\sqrt{e}$
24. 3
25. 2