

Sections 4.3-4.4

Exercise 1. Evaluate the expression

$$\log_2 64 + \log_9 3 + \ln(e^{\sqrt{3}}) + \log_3(15) + \log_3(75) - 3 \log_3(5) + e^{4 \ln(3)}$$

Exercise 2. Express

$$\log_2(x) + 5 \log_2(x - 2) - \frac{1}{3} \log_2(3x + 4)$$

as a single logarithm.

Exercise 3. Solve the following equations

1. $\log_3(x) = -2$.
2. $\ln(2x + 5) = -1$
3. $\ln(x - 4) + \ln(x + 2) = \ln(15)$
4. $\log_2(\log_5(\log_3(2x + 1))) = 0$.
5. $3^{2^x} = 7$
6. $5e^x - e^{2x} = 6$.

Exercise 4. Find each limits

1. $\lim_{x \rightarrow \infty} \ln(3x^2 + 5) - 2 \ln(x + 1)$.
2. $\lim_{x \rightarrow -\infty} \ln(e^{3x}) - \ln(e^x - e^{2x})$.

Exercise 5. Find the inverse function of

1. $y = 2^{e^{3x}}$
2. $y = (\ln(e^x + 1))^2 \quad x > 0$

Exercise 6. Find f' for

1. $f(x) = \ln(4e^{-x} + xe^{-x})$.
2. $f(x) = \ln \sqrt{\frac{x^2 + 1}{x^2 - 1}}$.
3. $f(x) = \sqrt{\ln \left(\frac{x^2 + 1}{x^2 - 1} \right)}$.
4. $f(x) = x^{\sin x} - (\sin x)^x$.

Exercise 7. Find an equation of the tangent line to the curve

$$y = 10^x$$

at $(1, 10)$.

Exercise 8. Use the logarithmic differentiation to find the derivative of

1. $f(x) = \frac{\tan^5 x (x^2 - 3 + 1)^6}{\sqrt{3x - 1} (2x + 5)^4}$.

2. $g(x) = \frac{x^{2/5} e^{x^2+3x} \sin^2 x}{\sqrt[3]{x} (2x - 7)^3}$.