

1. Differentiate $y = \ln(x + \ln(x + \ln(x)))$

2. Find $\frac{dy}{dx}$ by implicit differentiation of $x^3 + x^2y + xy^2 + y^3 = 1$

3. Differentiate $y = (\ln x)^{\ln x}$

4. Sketch the curve $y = x^{\frac{5}{3}} - 5x^{\frac{2}{3}}$

5. Sketch the curve $y = \ln(1 + x^2)$

6. Find $\lim_{x \rightarrow \infty} \frac{\ln(1+e^x)}{x}$

7. Find $\lim_{x \rightarrow \infty} (xe^{\frac{1}{x}} - x)$

8. Show that the equation $x^5 + x + 1 = 0$ has at least one root.

9. Determine $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{\pi}{2n} \sin \frac{i\pi}{2n}$

Hint: interpret as Riemann sums and evaluate the definite integral.

10. Evaluate $\int_1^2 (1 + \frac{1}{x})^2 dx$

11. Find $\frac{d}{dx} \int_1^{\sqrt{x}} \sqrt{t} dt$

12. Find all extrema of $f(x) = x + \frac{1}{x}$ for $\frac{1}{2} \leq x \leq 2$

13. #38 p.262.

14. #42 p.338.