

1. Evaluate $\lim_{x \rightarrow 0^+} \csc\left(\frac{x}{2}\right) \tan^{-1}(3x)$

2. Evaluate $\lim_{x \rightarrow 0^+} \frac{\log_5(3x)}{\cot x}$

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

4. Evaluate $\lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} (2 + \cos(2x))^{\tan x}$

5. Let $f(x) = \log_3 x^4$ and $g(x) = \ln \sqrt{5x}$ Which of the following is/are true? Show your work

I. $f = o(g)$

II. $f = O(g)$

III. $g = o(f)$

IV. $g = O(f)$

6. Evaluate $\lim_{x \rightarrow 0} (\cos x)^{\frac{1}{x^2}}$

7. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\pi}{x^2} \cos\left(\frac{1}{x}\right) dx$

8. Evaluate $\int_0^{-\infty} \cos(3x) e^x dx$

9. Evaluate $\int_1^3 \frac{6x}{\sqrt[3]{x^2 - 9}} dx$

10. Use the Direct Comparison Test or the Limit Comparison Test to determine if the following integral Converges or Diverges. Be sure to choose a related, simpler, p – value integral for comparison. $\int_0^3 \frac{2}{x^2 + 3x + \sqrt{x}} dx$

11. Evaluate $\int_{-1}^{\infty} \frac{2x}{(1+x^2)^{\frac{4}{3}}} dx$

12. Evaluate $\int \frac{x^2 + 3x + 1}{(x^2 + 1)(x^2 + 4)} dx$