

Do the following as indicated. Show all your work. No work, no point.

1. Find the limit, if it exists.

a.  $\lim_{x \rightarrow 0^+} x^2 \ln x$

b.  $\lim_{x \rightarrow 1^+} \left( \frac{1}{x-1} - \frac{1}{\ln x} \right)$

c.  $\lim_{x \rightarrow \frac{\pi}{2}^-} (\cos x)^{\cot x}$

2. Determine whether the integral converges or diverges, and if it converges, find its value.

a.  $\int_{-\infty}^{\infty} \frac{e^x}{e^{2x} + 1} dx$

b.  $\int_0^4 \frac{4}{x^2 - 2x - 3} dx$