

Family Name: \_\_\_\_\_

S.r# \_\_\_\_\_

Q1. Determine the intervals for which  $f(x) = \frac{\ln x + \tan^{-1} x}{x^2 - 1}$  is continuous.

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Q2. If  $f(x) = x + \ln x$ , prove that  $\exists c \in (1, e)$ , such that  $f(c) = 2$  ?

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Q3. Find the **equation(s)** of the asymptotes (if any) for:

i.  $f(x) = \frac{\sqrt{4x^2 + 3}}{x + 1}$

ii.  $f(x) = \tan^{-1} \left( \frac{e^{-x}}{1 - e^{-x}} \right)$

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Q4. Find  $k$  that will make the function  $f(x)$  continuous everywhere.

$$f(x) = \begin{cases} (x - 1)^2 \sin\left(\frac{\pi}{x-1}\right) & , x \neq 1 \\ k & , x = 1 \end{cases}$$

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