$f(x) = \frac{\ln x}{x} \quad [1,3]$

$f'(x) = \frac{x \cdot \frac{1}{x} - \ln x}{x^2} = \frac{1 - \ln x}{x^2}$

<u>critical #s:</u>

$1 - \ln x = 0$

$\ln x = 1$

$x = e$

$x^2 = 0$

$x = 0$

↑ not in interval

$f(1) = \frac{\ln 1}{1} = 0 \leftarrow$ min

$f(e) = \frac{\ln e}{e} = \frac{1}{e} \leftarrow$ max

$f(3) = \frac{\ln 3}{3}$

Why is $\frac{1}{e} > \frac{\ln 3}{3}$?

$f'(x)$: $+$ between 0 and e, $-$ after e

$\Rightarrow$ e is a local max

Since e is a local max, f(e) will be greater than the numbers around it (such as f(3)).

So, $\frac{1}{e} > \frac{\ln 3}{3}$.