$$\left\{ \left(\frac{1}{3n}\right)^{\left(\frac{5}{\ln(4n)}\right)} \right\}$$

$$\lim_{n \to \infty} \left(\frac{1}{3n}\right)^{\left(\frac{5}{\ln(4n)}\right)}$$

Notice that F

For all n =

converge? diverge?

$= ?$

or all $x > 0$, $x = e^{\ln}$

$1, 2, 3, \ldots$, $\frac{1}{3n} > 0$.

, (✓)

.

So,

$$\frac{1}{3n} = e^{\ln\left(\frac{1}{3n}\right)}$$

Then, $\left(\frac{1}{3n}\right)^{\left(\frac{5}{\ln(\ldots}\right.}$

Hence, $\lim\limits_{n\to\infty}\left(\frac{1}{3n}\right.$

$\lim \quad \ln(3n)$

$$= e^{\ln(1) - \ln(3n)} \quad = e^{-\ln}$$

$$4n))$$

$$= \left(e^{-\ln(3n)}\right)^{\left(\frac{5}{\ln(4n)}\right)}$$

$$)^{\left(\frac{5}{\ln(4n)}\right)} = \lim_{n \to \infty} e^{-5 \cdot \frac{\ln}{\ln}}$$

$$) \quad \lim \quad \frac{1}{2n} \cdot 3$$

$n(3n)$

$$= e^{-5 \cdot \frac{\ln(3n)}{\ln(4n)}}.$$

$$\frac{n(3n)}{n(4n)} = e^{-5 \cdot \lim_{n\to\infty} \frac{\ln(3n)}{\ln(4n)}}.$$

$h.$ L'Hôpital's

Here, $\lim_{n\to\infty} \dfrac{\ln \ldots}{\ln(4n\ldots}$

$\dfrac{\infty}{\infty}$

$= \lim_{n\to\ldots}$

Thus, $e^{-5 \cdot \lim_{n\to\infty} \frac{\ln\ldots}{\ldots}}$

$$= \lim_{n\to\infty} \frac{3n}{\frac{1}{4n}\cdot 4}$$

: indeterminate

$$\lim_{n\to\infty} \frac{\frac{1}{n}}{\frac{1}{n}} = \lim_{n\to\infty} 1 =$$

$$\frac{n(3n)}{\ln(4n)} = e^{-5\cdot 1} = e$$

Rule

1.

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