



1. (4 pts) Compute the limit of the sequence $\left\{ \frac{\ln(n^5)}{n} \right\}_{n=1}^{\infty}$

Handwritten solution for problem 1:

$$\lim_{n \rightarrow \infty} \frac{\ln(n^5)}{n}$$

$$\lim_{x \rightarrow \infty} \frac{\ln(x^5)}{x} = \lim_{x \rightarrow \infty} \frac{1}{x^5} \cdot 5x^4 = \lim_{x \rightarrow \infty} \frac{5x^4}{x^5}$$

$$= \lim_{x \rightarrow \infty} \frac{5}{x} = 0$$

The final result is circled: $\lim_{n \rightarrow \infty} \frac{\ln(n^5)}{n} = 0$ ✓

Thanks to Ali La Rue

2. (3 pts) Does the following geometric series converge? If so, find the sum.

$$\sum_{n=0}^{\infty} 5 \frac{3^k}{2^k}$$

Handwritten solution for problem 2:

$$\sum_{n=0}^{\infty} 5 \frac{3^k}{2^k}$$

$$\sum_{k=0}^{\infty} 5 \left(\frac{3}{2}\right)^k$$

The geometric series does not converge because $\left|\frac{3}{2}\right| > 1$ ✓

Thanks to Phillip Simen

3. (3 pts) Does the following geometric series converge? If so, find the sum.

$$\sum_{n=0}^{\infty} 5 \frac{3^k}{2^{2k}}$$

Handwritten solution for problem 3:

$$\sum_{n=0}^{\infty} 5 \frac{3^k}{2^{2k}} = \sum_{k=0}^{\infty} 5 \left(\frac{3}{4}\right)^k$$

Because $r = \frac{3}{4} < 1$

$$\sum_{k=0}^{\infty} 5 \left(\frac{3}{4}\right)^k = \frac{5}{1 - \frac{3}{4}} = \frac{5}{\frac{1}{4}} = 5 \cdot 4 = 20$$

Geometric series converges to 20 ✓

Thanks to Casey Hensel