Quiz #9

MATH 126-101 — Calculus II
Thursday, Nov 12, 2026

Please print your name:

Problem 1. (3 points) Write down the geometric series. When does it converge, and what does it converge to?

Solution. The geometric series $\sum_{n=0}^{\infty} x^n$ converges if and only if $|x|<1$. In that case, $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$.

Problem 2. (2 points) Write down the p-series. When does it converge?

Solution. The p-series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges if and only if $p>1$.

Problem 3. (5 points) Determine whether the following series converge or diverge. Make sure to indicate a reason!

(a) $\sum_{n=1}^{\infty} \frac{n+1}{n^3+1}$

☐ series converges ☐ series diverges

Indicate a reason:

The series converges by limit comparison with $\sum_{n=1}^{\infty} \frac{n}{n^3} = \sum_{n=1}^{\infty} \frac{1}{n^2}$

(which is a p-series with $p=2>1$ and so converges).

(b) $\sum_{n=2}^{\infty} \frac{n+\sqrt{n}+7}{3n^2+1}$

☐ series converges ☐ series diverges

Indicate a reason:

The series diverges by limit comparison with $\sum_{n=1}^{\infty} \frac{n}{3n^2} = \frac{1}{3}\sum_{n=1}^{\infty} \frac{1}{n}$

(which is the harmonic series and diverges).

(c) $\sum_{n=2}^{\infty} \frac{1-\ln(n)}{1+\ln(n)}$

☐ series converges ☐ series diverges

Indicate a reason:

The series diverges (by the nth term test)

because $\frac{1-\ln(n)}{1+\ln(n)} \to -1 \neq 0$ as $n \to \infty$.

Armin Straub
straub@southalabama.edu