Each problem is worth 6 points.
Determine the convergence or divergence of each series, state the test used, and demonstrate its use.

1. \[ \sum_{n=1}^{\infty} \frac{1}{n^3} \]

2. \[ \sum_{n=0}^{\infty} \frac{4^{n+1}}{5^n} \]

3. \[ \sum_{n=1}^{\infty} (-1)^n \]

4. \[ \sum_{n=1}^{\infty} \frac{1}{e^n} \]
5. \[ \sum_{n=1}^{\infty} \frac{\arctan n}{n^4} \]

6. \[ \sum_{n=1}^{\infty} \left(n \sqrt{2}\right)^n \]

7. \[ \sum_{n=1}^{\infty} n^2 e^{-n^3} \]

8. \[ \sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n + 1)} \]
9. \[ \sum_{n=1}^{\infty} \frac{n}{n+1} \]

10. \[ \sum_{n=1}^{\infty} \frac{n+5}{5^n} \]

11. \[ \sum_{n=1}^{\infty} \frac{\sqrt{n^2 - 1}}{n^3 + 2n^2 + 5} \]

12. Determine if series is Absolutely or Conditionally Convergent, or Diverges \[ \sum_{n=1}^{\infty} (-1)^{n-1} n^{-1} \]
13. Determine if series is Absolutely or Conditionally Convergent, or Diverges \( \sum_{n=1}^{\infty} (-1)^{n-1} n^{-2} \)

14. Find the sum of the series. \( 2 + \frac{2}{3} + \frac{2}{9} + \frac{2}{27} + \cdots \)

15. Express the number 1.\overline{36} as a ratio of integers.

16. How many terms of the alternating series \( \sum_{n=1}^{\infty} (-1)^{n+1} n^{-2} \) must be added in order to be sure that the partial sum \( S_n \) is within 0.0001 of the true sum?