

PRACTICE WITH *ALL* OF THE SERIES TESTS

Directions: Determine whether the given series diverges, converges conditionally or converges absolutely. If it is geometric, compute the sum.

BE SURE TO STATE WHICH TEST(S) YOU USE.

1.
$$\sum_{n=0}^{\infty} (-1)^n (0.3)^n$$

2.
$$\sum_{n=1}^{\infty} n^{-1/4}$$

3.
$$\sum_{n=2}^{\infty} \frac{n}{(n^3 - 1)^{3/7}}$$

4.
$$\sum_{n=1}^{\infty} \frac{n!}{e^n}$$

5.
$$\sum_{n=3}^{\infty} \frac{\cos n\pi}{\sqrt{n}}$$

6.
$$\sum_{n=0}^{\infty} \frac{n^2}{n+1}$$

7.
$$\sum_{n=2}^{\infty} \frac{1}{(\ln n)^n}$$

8.
$$\sum_{n=3}^{\infty} \frac{\sin^2 n}{n^{3/2}}$$

9.
$$\sum_{n=3}^{\infty} \frac{n^2 - \sqrt{n}}{4 - n^2}$$

10.
$$\sum_{n=1}^{\infty} \frac{1}{n\sqrt{n} - n}$$

11.
$$\sum_{n=0}^{\infty} (-1)^n \frac{3^n}{2^{n+2}}$$

12.
$$\sum_{n=1}^{\infty} \frac{12}{n^{0.9999}}$$

13.
$$\sum_{n=1}^{\infty} \frac{n}{e^n}$$

Solutions (and Hints)

1. Converges absolutely to $10/13$. *Geometric Series Test*
2. Diverges. *P-series Test*, $p = 1/4$
3. Diverges. *Direct Comparison with* $\sum \frac{n}{n^{9/7}} = \sum \frac{1}{n^{2/7}}$
4. Diverges. *Ratio Test*
5. Converges conditionally. *Alternating Series Test*
6. Diverges. *Divergence Test*
7. Converges absolutely. *Root Test*
8. Converges absolutely. *Direct Comparison Test*
9. Diverges. *Divergence Test*
10. Converges absolutely. *Limit Comparison with* $\sum \frac{1}{n^{3/2}}$
11. Diverges. *Geometric Series Test*, $r = -3/2$
12. Diverges. *P-series Test*, $p = 0.9999$
13. Converges absolutely. *Integral Test*