

Determine whether each series converges or diverges. Tell which test you used. If you used the comparison test or limit comparison test, give the comparison series. If the series is a geometric series, give r , and if it is a convergent geometric series, find the sum. For any convergent alternating series, also determine if it is absolutely convergent.

1.
$$\sum_{n=1}^{\infty} \frac{2}{3n}$$

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

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

4.
$$\sum_{n=1}^{\infty} \frac{2n+1}{3n+2}$$

5.
$$\sum_{n=1}^{\infty} \frac{\ln n}{n^3}$$

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

7.
$$\sum_{n=1}^{\infty} \frac{2^n}{n!}$$

8.
$$\sum_{n=1}^{\infty} \frac{(2n+3)^2}{(n+1)^3}$$

9.
$$\sum_{n=1}^{\infty} 5(-1)^n \left(\frac{2}{3}\right)^{n-1}$$

10.
$$\sum_{n=1}^{\infty} (-1)^n \frac{n+1}{2n^3 + n}$$

11.
$$\sum_{n=1}^{\infty} \frac{n^{100}}{n!}$$

12.
$$\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2}$$