

Determine, for each of the following infinite series, whether the series converges:

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

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

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

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