Does $\sum_{n=1}^{\infty} 2^n$ diverge, converge absolutely, or converge conditionally?

Solution

Consider the limit of the sequence a_n.

$$\begin{aligned}\lim_{n\to\infty} a_n &= \lim_{n\to\infty} 2^n \\ &= \infty.\end{aligned}$$

so the series $\sum_{n=1}^{\infty} 2^n$ diverges by the Test for Divergence.

Solution 2

$\sum_{n=1}^{\infty} 2^n$ is a geometric series with $r = 2$. Since $|r| \geq 1$, the series $\sum_{n=1}^{\infty} 2^n$ diverges by the Geometric Series Test.