

Problems for Gateway #1: Convergence of an Infinite Series

1. The condition $a_k \rightarrow 0$ as $k \rightarrow \infty$ is sufficient to:
 - (a) Guarantee that the series: $a_1 + a_2 + a_3 + \dots$ converges.
 - (b) Guarantee that the series converges to positive infinity as $k \rightarrow \infty$.
 - (c) Guarantee nothing about the convergence about the series.
 - (d) Guarantee that the series converges to zero as $k \rightarrow \infty$.

2. The condition $a_k \rightarrow 0$ as $k \rightarrow \infty$ is a necessary prerequisite for:
 - (a) Convergence of the series.
 - (b) Convergence of the series to zero.
 - (c) Divergence of the series.
 - (d) Divergence of the series to a number other than zero.

3. A test that will determine the convergence of a **FINITE** series is:
 - (a) The ratio test.
 - (b) The comparison test.
 - (c) If the terms in the series are a_k then if $a_k \rightarrow 0$ as $k \rightarrow \infty$ then the series must converge.
 - (d) No test is necessary as a finite series will always converge.

4. A convergent geometric series: $a + ar + ar^2 + ar^3 + \dots$
 - (a) Does not obey the condition $a_k \rightarrow 0$ because a_k is not defined.
 - (b) Obeys the condition that $a_k \rightarrow 0$ but only when $-1 < a < 1$.
 - (c) Does not obey the condition $a_k \rightarrow 0$ when r is a negative number.
 - (d) Obeys the condition that $a_k \rightarrow 0$ irrespective of the value of a .

5. The sum of an infinite series is:
- (a) Always equal to plus infinity or minus infinity.
 - (b) Possibly finite, possibly infinite, or may not exist at all depending on the particular series.
 - (c) Equal to plus infinity unless most of the terms added together are equal to zero.
 - (d) Impossible to determine precisely as you can never actually add an infinite number of terms.

Answers

1. C 2. A 3. D 4. D 5. B