

Fill in the blanks by looking up the answers from the given pages.

Strategy for series with positive terms

Determine whether the infinite series $\sum_{k=1}^{\infty} a_k$ with **positive terms** converge or diverge.

1. (11.2 page 710) **The Geometric Series** \rightarrow when $\sum_{k=1}^{\infty} a_k$ has the form $\sum_{k=1}^{\infty} r^k$

If $|r| \geq 1$, _____. If $|r| < 1$, _____.

2. (11.4 page 728) **The p-Series** \rightarrow when $\sum_{k=1}^{\infty} a_k$ has the form $\sum_{k=1}^{\infty} \frac{1}{k^p}$

If $p \leq 1$, _____. If $p > 1$, _____.

3. (11.2 page 713) **The Divergence Test**

If $\lim_{k \rightarrow \infty} a_k = 0$, _____. If $\lim_{k \rightarrow \infty} a_k \neq 0$, _____.

4. (11.2 Ex. 8) **The Telescoping Series** \rightarrow when $\sum_{k=1}^{\infty} a_k$ can be reduced to $\sum_{k=1}^{\infty} (b_k - b_{k+1})$

$S_n =$ _____. If $\lim_{n \rightarrow \infty} S_n$ exists, _____. Otherwise, _____.

5. (11.6) **The Ratio Test** \rightarrow when a_k involves factorials or powers. Consider $r = \lim_{k \rightarrow \infty} \frac{a_{k+1}}{a_k}$.

If $0 \leq r < 1$, _____. If $r > 1$, _____. If $r = 1$, _____.

6. (11.6) **The Root Test (optional)** \rightarrow when a_k involves powers. Consider $r = \lim_{k \rightarrow \infty} \sqrt[k]{a_k}$.

If $0 \leq r < 1$, _____. If $r > 1$, _____. If $r = 1$, _____.

7. (11.4 page 729) **The Limit Comparison Test** \rightarrow when a_k involves dominant terms (p-series, polynomial/polynomial, or a geometric series). Consider $\lim_{k \rightarrow \infty} \frac{a_k}{b_k} = L$.

If $0 < L < \infty$ and $\sum_{k=1}^{\infty} b_k$ converges, _____. If $0 < L < \infty$ and $\sum_{k=1}^{\infty} b_k$ diverges, _____.

If $L = 0$ and $\sum_{k=1}^{\infty} b_k$ converges, _____. If $L = 0$ and $\sum_{k=1}^{\infty} b_k$ diverges, _____.

If $L = \infty$ and $\sum_{k=1}^{\infty} b_k$ converges, _____. If $L = \infty$ and $\sum_{k=1}^{\infty} b_k$ diverges, _____.

8. (11.4 page 727) **The Comparison Test** \rightarrow when none of the above methods works or when there is an obvious comparison or when you want to think.

If $0 < a_k \leq b_k$ and $\sum_{k=1}^{\infty} b_k$ converges, _____. If $0 < a_k \leq b_k$ and $\sum_{k=1}^{\infty} b_k$ diverges, _____.

If $0 < b_k \leq a_k$ and $\sum_{k=1}^{\infty} b_k$ converges, _____. If $0 < b_k \leq a_k$ and $\sum_{k=1}^{\infty} b_k$ diverges, _____.

For each of the eight tests above (except the telescoping series and root test), choose a question from the Week 4 sample quiz which uses that test, and solve that question. Each example on the sample quiz and actual quiz uses at least two tests, so make sure you indicate more than one test for each problem.

- **The Geometric Series**

- **The p -Series**

- **The Divergence Test**

- **The Ratio Test**

- **The Limit Comparison Test**

- **The Comparison Test**