Strategy for series with positive terms Fill in the blanks by looking up the answers from the given pages.

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** → when $\sum_{k=1}^{\infty} a_k$ has the form $\sum_{k=1}^{\infty} r^k$

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

2. (11.2 page 713) **The Divergence Test**

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

3. (11.2) **Harmonic Series, special case of *p*-Series** → $\sum_{k=1}^{\infty} a_k = \sum_{k=1}^{\infty} \frac{1}{k^p}$ with p =1.

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

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

5. (11.4 page 727) **The Comparison Test** → when none of the above methods works or when there is an obvious comparison.

   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, _____.

6. (11.4 page 729) **The Limit Comparison Test (most versatile)** → when a_k involves dominant terms (p-series, rational function, or a geometric series). Consider $\lim_{k\to\infty} \frac{a_k}{b_k} = L$.

   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, _____.

7. (11.4 page 728) **The *p*-Series** → when $\sum_{k=1}^{\infty} a_k$ has the form $\sum_{k=1}^{\infty} \frac{1}{k^p}$

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

8. (11.6) **The Ratio Test** → when a_k involves factorials or powers. Consider $r = \lim_{k\to\infty} \frac{a_{k+1}}{a_k}$.

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

For each of the eight strategies above (except telescoping), choose two questions from these Exam 1 practice questions
egunawan.github.io/spring18/notes/notes11_strategy_pos_terms_practice.pdf (printed) which can use that test, and solve that question.
If you apply the Limit Comparison Test or the Comparison Test, you must use at least two tests, so make sure you indicate both tests.

- **The Geometric Series**

Question I:

Computation + Explanation:

Conclusion:

Question II:

Computation + Explanation:

Conclusion:

- **The *p*-Series**

Question I:

Computation + Explanation:

Conclusion:

Question II:

Computation + Explanation:

Conclusion:

- **The Divergence Test**

Question I:

Computation + Explanation:

Conclusion:

Question II:

Computation + Explanation:

Conclusion:

- **The Ratio Test**

Question I:

Computation + Explanation:

Conclusion:

Question II:

Computation + Explanation:

Conclusion:

- **The Limit Comparison Test**

Question I:
Computation + Explanation:

Conclusion:

Question II:
Computation + Explanation:

Conclusion:

- **The Comparison Test (optional)**

Question: