

Section 9.4

After viewing the lecture videos and reading the textbook, you should be able to answer the following questions:

The Limit Comparison Test

Let $\sum a_k$ and $\sum b_k$ be series with positive terms and suppose

$$\rho = \lim_{k \rightarrow \infty} \frac{a_k}{b_k}$$

- a) If ρ is finite and $\rho > 0$, then the series both converge or both diverge.
- b) If $\rho = 0$ and $\sum b_k$ converges, then $\sum a_k$ converges.
- c) If $\rho = \infty$ and $\sum b_k$ diverges, then $\sum a_k$ diverges.

1. Suppose $\rho = \infty$ and $\sum b_k$ converges. Does $\sum a_k$ converge or diverge?
2. Suppose $\rho = 0$ and $\sum b_k$ diverges. Does $\sum a_k$ converge or diverge?
3. Suppose you know how $\sum a_k$ behaves and you are trying to find out how $\sum b_k$ behaves.
 - a. Suppose $\rho = \infty$ and $\sum a_k$ converges. Does $\sum b_k$ converge or diverge?
 - b. Suppose $\rho = 0$ and $\sum a_k$ converges. Does $\sum b_k$ converge or diverge?
 - c. Suppose $\rho = \infty$ and $\sum a_k$ diverges. Does $\sum b_k$ converge or diverge?
 - d. Suppose $\rho = 0$ and $\sum a_k$ diverges. Does $\sum b_k$ converge or diverge?

The Moral of #3 is: Always let $\sum b_k$ represent the series that you know the behavior of.