

Math 102 — Introduction to comparison test

Problem 1. For each a_n and b_n pair below, decide which is true:

$$\sum_{n=1}^{\infty} a_n \leq \sum_{n=1}^{\infty} b_n \quad \text{or} \quad \sum_{n=1}^{\infty} a_n \geq \sum_{n=1}^{\infty} b_n.$$

Notice that in each pair, $\sum_{n=1}^{\infty} b_n$ is a series that you know converges or diverges using your established knowledge about p -series and geometric series. Use this to make a conclusion about whether $\sum_{n=1}^{\infty} a_n$ converges or diverges if possible.

a. $a_n = \frac{1}{n^2+4n+7}, b_n = \frac{1}{n^2}$

b. $a_n = \frac{1}{n^{3.5}+n^2+n+4}, b_n = \frac{1}{n^{3.5}}$

c. $a_n = \frac{n^2+n+1}{n^3}, b_n = \frac{1}{n}$

d. $a_n = \frac{1}{\sqrt{n^2-0.5}}, b_n = \frac{1}{n}$

e. $a_n = \frac{2^n}{5^n+10}, b_n = \frac{2^n}{5^n}$