Let $\sum a_n$ and $\sum b_n$ be series with positive terms.

If $\sum b_n$ is convergent and $a_n > b_n$, what can you say about $\sum a_n$?

If $\sum b_n$ is convergent and $a_n < b_n$, what can you say about $\sum a_n$?

If $\sum b_n$ is divergent and $a_n > b_n$, what can you say about $\sum a_n$?

If $\sum b_n$ is divergent and $a_n < b_n$, what can you say about $\sum a_n$?

Use the comparison test to determine whether the series converges or diverges.

1. $\sum_{n=1}^{\infty} \frac{1}{n^4 + 6}$

2. $\sum_{n=1}^{\infty} \frac{2^n}{5^n + 2}$
3. \[ \sum_{n=1}^{\infty} \frac{1}{\sqrt{2n^3 + n^2 + 4}} \]

4. \[ \sum_{n=1}^{\infty} \frac{7^n}{5^n - 2} \]

5. \[ \sum_{n=1}^{\infty} \frac{2 + \sin n}{e^n} \]
On this page, you will need to use the Limit Comparison Test.

6. \[ \sum_{n=1}^{\infty} \frac{3n^2 + 2n + 1}{5n^4 + 4n^2} \]

7. \[ \sum_{n=1}^{\infty} \frac{1}{n\sqrt{n^2 - 1}} \]

8. \[ \sum_{n=1}^{\infty} \frac{2^n + 3}{n^{2n+1} - 1} \]
9. Show that the following series converges for all $p > 1$.

$$\sum_{n=2}^{\infty} \frac{1}{n^p \ln n}$$

10. The decimal representation $0.d_1d_2d_3d_4\ldots$, where each digit $d_i$ is one of the numbers $0, 1, 2, 3, 4, 5, 6, 7, 8, 9$ means that

$$0.d_1d_2d_3d_4\ldots = \frac{d_1}{10} + \frac{d_2}{10^2} + \frac{d_3}{10^3} + \frac{d_4}{10^4} + \ldots$$

Use the Comparison Test to explain why this series always converges.

Let $a$ be the number with decimal representation $0.\bar{9} = 0.999999\ldots$ (that is, $d_i = 9$ for all $i$). Find the value of $a$. 