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 $\sum a_n$?
- Nothing

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

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

If $\sum b_n$ is divergent and $a_n < b_n$, what can you say about $\sum a_n$?
- Nothing

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

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

2. $\sum_{n=1}^{\infty} \frac{2^n}{5^n + 2}$
   - Convergent

3. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{2n^3 + n^2 + 4}}$
   - Convergent

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

5. $\sum_{n=1}^{\infty} \frac{2 + \sin n}{e^n}$
   - Convergent

On this page, you will need to use the Limit Comparison Test.

6. $\sum_{n=1}^{\infty} \frac{3n^2 + 2n + 1}{5n^4 + 4n^2}$
   - Convergent

7. $\sum_{n=1}^{\infty} \frac{1}{n\sqrt{n^2 - 1}}$
   - Convergent
8. \[ \sum_{n=1}^{\infty} \frac{2^n + 3}{n2^{n+1} - 1} \]

Divergent

9. Show that the following series converges for all \( p > 1 \).

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

Compare with \( \sum \frac{1}{n^p} \)

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

\[ 0.d_1d_2d_3d_4 \ldots = d_1 \frac{1}{10} + d_2 \frac{1}{10^2} + d_3 \frac{1}{10^3} + d_4 \frac{1}{10^4} + \cdots \]

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

Less than the convergent geometric series \( \sum_{n=1}^{\infty} 10 \cdot \left( \frac{1}{10} \right)^n \)

Let \( a \) be the number with decimal representation \( 0.9 = 0.9999999\ldots \) (that is, \( d_i = 9 \) for all \( i \)). Find the value of \( a \).

\( a = 1 \)