Review 154. If $\lim_{n\to\infty} a_n = L$, then

- $\lim_{n\to\infty} a_n^2 =$
- $\lim_{n\to\infty} (a_n - 1) =$
- $\lim_{n\to\infty} a_{n-1} =$
- $\lim_{n\to\infty} \left(1 + \frac{1}{a_{n-1}}\right) =$

Review 155. Recall that if $\lim_{n\to\infty} a_n$ is not 0, then $\sum_{n=N}^{\infty} a_n$ diverges.

You should always think about this condition first. (Because it is so simple to check!)
If $\lim_{n\to\infty} a_n \neq 0$, then we are done (the series diverges), while, if $\lim_{n\to\infty} a_n = 0$, then we haven't learned anything.

Review 156.

- $\sum_{n=2}^{\infty} 2^n$

  First, what is $\lim_{n\to\infty} 2^n$? ... Your final answer should be that the series diverges.

- $\sum_{n=2}^{\infty} 2^{-n}$

  First, what is $\lim_{n\to\infty} 2^{-n}$? ... Your final answer should be that the series converges and equals $2 - 1 - \frac{1}{2} = \frac{1}{2}$.

- $\sum_{n=0}^{\infty} \frac{2^n + 3^n}{5^n}$

  Your final answer should be that the series converges and equals $\frac{1}{1-\frac{2}{5}} + \frac{1}{1-\frac{3}{5}} = \frac{25}{6}$.

- $\sum_{n=2}^{\infty} \frac{\sqrt{n}}{\log n}$

  Your final answer should be that the series diverges.

- $\sum_{n=0}^{\infty} \frac{n^2}{n^2+7}$

  Your final answer should be that the series diverges.

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

  Recall that we used the integral comparison test to determine convergence of the p-series.
  From now on, the integral comparison test should be your last resort! Avoid it if at all possible. (For more complicated series, the corresponding integrals are usually just as difficult to handle.)

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

  Rewrite the series as $\sum_{n=1}^{\infty} \left(\frac{1}{n} + \frac{1}{n^2}\right)$ and split it into the sum of two series.
  Your final answer should be that our series diverges.