

1. Is the following statement correct: if $\lim_{n \rightarrow \infty} a_n = 1$ then $\lim_{n \rightarrow \infty} (n a_n) = n$?
2. Find $\lim_{n \rightarrow \infty} (\sin n) 2^{-n}$.
3. Evaluate $\lim_{n \rightarrow \infty} (\sqrt{n+1} - \sqrt{n})$.
Hint: use $x^2 - y^2 = (x+y)(x-y)$.
4. Find $\lim_{n \rightarrow \infty} \left(\frac{c^{2n} - 1}{c^{2n} + 1} \right)$ for all real values of c .
Look separately at $|c| > 1$, $|c| < 1$ and $|c| = 1$.
5. Show that $a_n \rightarrow +\infty$ if and only if $\limsup a_n = \liminf a_n = +\infty$.