

1. For each of the following limit statements (about a sequence), give the formal definition.
 - (a) $\lim_{n \rightarrow \infty} a_n = L$ (L a real number)
 - (b) $\lim_{n \rightarrow \infty} a_n = +\infty$
2. Do (a) or (b), not both. For either (a) or (b) give a proof showing that the given statement is true. Your proof should be written in complete sentences and should be one that is based on the relevant formal definition, not on limit theorems or known limits.
 - (a) $\lim_{n \rightarrow \infty} \frac{3n - 11}{n} = 3$
 - (b) $\lim_{n \rightarrow \infty} (3n - 1) = +\infty$
3. Suppose that $\sum_{n=1}^{\infty} a_n$ is a series whose partial sums are given by $S_n = \frac{10n}{n+2}$.
 - (a) Find $\sum_{n=1}^{98} a_n$.
 - (b) Find a_{10} .
 - (c) Use the definition of series convergence to verify that the given series converges.
 - (d) Find the sum of the given series.
4. (a) Find $\lim_{n \rightarrow \infty} \frac{\cos n + 3n}{n}$. Then use the Sandwich Theorem to prove that your answer is correct.
 - (b) Does the sequence with general term $a_n = \sin\left(\frac{(4n+3)\pi}{2}\right)$ converge? Why or why not?
 - (c) Find $\lim_{n \rightarrow \infty} \left(\frac{5+n}{3+n}\right)^n$