

Question

Explain **exactly** what is meant by the following statements:

1. $\lim_{n \rightarrow \infty} 3^{2n-1} = \infty$;
2. $\lim_{n \rightarrow \infty} (1 - 2n) = -\infty$;
3. $\lim_{n \rightarrow \infty} e^{-n} = 0$;

Answer

(This is an exercise in writing out the definition of the convergence or divergence of a sequence for a triple of specific examples. Note that we are not asked to determine whether the given statements are true or false, or to prove them if they are true, but just to write them down.)

- for every $\varepsilon > 0$, there exists M so that $3^{2n-1} > \varepsilon$ for all $n > M$.
- for every $\varepsilon > 0$, there exists M so that $1 - 2n < -\varepsilon$ for all $n > M$.
- for every $\varepsilon > 0$, there exists M so that $|e^{-n} - 0| < \varepsilon$ for all $n > M$.