

Do the following sequences converge or diverge?

If the sequence converges, find the limit.

1.  $\{c_k\}_{k=1}^{\infty}$  where  $c_k = (-1)^k$

2.  $\left\{1 - \frac{1}{j}\right\}_{j=1}^{\infty}$

3.  $\left\{\frac{5k^2 - 42}{3k^2 + 5}\right\}_{k=1}^{\infty}$

4.  $\left\{\frac{\sin k}{k^2}\right\}_{k=1}^{\infty}$

5.  $\{n^{1/n}\}_{n=1}^{\infty}$