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. $\left\{1 - \dfrac{1}{j}\right\}_{j=1}^{\infty}$
3. $\left\{\dfrac{5k^2 - 42}{3k^2 + 5}\right\}_{k=1}^{\infty}$
4. $\left\{\dfrac{\sin k}{k^2}\right\}_{k=1}^{\infty}$
5. $\left\{n^{1/n}\right\}_{n=1}^{\infty}$