

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

3.  $\left\{ \frac{e^j}{j^2 + 32j} \right\}_{j=3}^{\infty}$

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