Do the following sequences converge or diverge?
If the sequence converges, find the limit.

1. $\left\{(-1)^k\right\}_{k=1}^{\infty}$

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

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

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