

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

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

2.  $\{(-1)^{2k}\}_{k=1}^{\infty}$

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

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