

5. Does the series  $\sum_{k=1}^{\infty} \frac{5}{k+3}$  converge? Justify your answer. Find the sum of the series if you can.

series is  $\frac{5}{4} + \frac{5}{5} + \frac{5}{6} + \frac{5}{7} + \frac{5}{8} + \frac{5}{9} + \dots$

$$5 \sum_{k=1}^{\infty} \frac{1}{k} - \left( \frac{5}{1} + \frac{5}{2} + \frac{5}{3} \right)$$

harmonic series  $\sum_{k=1}^{\infty} \frac{1}{k}$  diverges so the given series, which is a finite number  $\sum_{k=1}^{\infty} \frac{1}{k}$  short of 5 times the harmonic series, also

diverges

6. Does the series  $\sum_{k=1}^{\infty} \frac{3^{k+1}}{2^{k-1}}$  converge? Justify your answer. Find the sum of the series if you can.

The  $k^{\text{th}}$  term is  $\frac{3^{k+1}}{2^{k-1}} = 9 \left( \frac{3}{2} \right)^{k-1}$  as  $k$  goes to  $\infty$   $\left| \frac{3}{2} \right|^{k-1}$  goes to  $\infty$  (very quickly).  $\lim_{k \rightarrow \infty} a_k \neq 0$  so the  $n^{\text{th}}$  term test shows that the series diverges.