

1. Consider $\sum_{n=2}^{\infty} 16 \left(\frac{-3}{4} \right)^n$.

(a) List the first five terms in the sequence of terms $\{a_n\}$.

(b) Find the sum of the series.

2. Consider $\sum_{k=2}^{\infty} \ln \left(\frac{k}{k+1} \right)$.

(a) List the first five terms in the sequence of partial sums $\{S_k\}$.

(b) Find a closed formula for S_k .

(c) Find the sum of the series by evaluating $\lim_{k \rightarrow \infty} S_k$.

3. Use a convergence test of your choice to determine whether the following series converge or diverge. Make a careful argument to justify your answers.

(a)
$$\sum_{n=2}^{\infty} \frac{1}{\sqrt[n]{e}}$$

(b)
$$\sum_{k=2}^{\infty} \frac{2^{3k-1}}{(2k-3)!}$$

(c)
$$\sum_{k=1}^{\infty} (3k^2 + k + 1)^{-1/2}$$

4. Determine whether the following series converge or diverge. In the case of convergence, state whether the convergence is conditional or absolute. Make sure that all of your conclusions are well-supported with careful arguments.

(a)
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n(1+n)}}$$

(b)
$$\sum_{k=0}^{\infty} \frac{(-2)^k}{1+2^k}$$

(c)
$$\sum_{n=1}^{\infty} (-1)^n n e^{-n}$$