Worksheet: Partial Sums

Q1: Consider the series $\sum_{n=1}^{\infty} \ln\left(\frac{n+1}{n}\right)$.

- Give an exact expression for the partial sum $\sum_{n=1}^{M} \ln\left(\frac{n+1}{n}\right)$.

A $\ln\left(\frac{M}{M+1}\right)$

B $\ln(M-1)$

C $\ln(M+1)$

D $\ln M$

E $\ln\left(\frac{M}{M-1}\right)$

- Is the series convergent?

A no

B yes

Q2:

- Find the partial sum for the series $\sum_{n=1}^{\infty} e^{\frac{1}{n}} - e^{\frac{1}{n+1}}$.

A $S_n = e^{\frac{1}{n+1}}$

B $S_n = e - e^{\frac{1}{n+1}}$

C $S_n = e$

D $S_n = e + e^{\frac{1}{n+1}}$

E $S_n = e - e^{\frac{1}{n}}$

- Is the series convergent or divergent?

A Divergent

B Convergent

Q3:

- Find the partial sum for the series $\sum_{n=1}^{\infty} 2\left(\frac{1}{2}\right)^{n-1}$.

A $S_n = 4\left(1 - \left(\frac{1}{2}\right)^n\right)$

B $S_n = 2\left(1 - \left(\frac{1}{2}\right)^n\right)$

C $S_n = \frac{1}{4}$

D $S_n = \left(1 - \left(\frac{1}{2}\right)^n\right)$

E $S_n = 4$

- Is the series convergent or divergent?

A Convergent

B Divergent

Q4:

- Find the partial sum for the series $\sum_{n=1}^{\infty} \frac{2}{(n+3)(n+4)}$.

A $S_n = \frac{n+7}{2(n+3)}$

B $S_n = \frac{n+8}{2(n+4)}$

C $S_n = \frac{n}{2(n+3)}$

D $S_n = \frac{n}{2(n+4)}$

E $S_n = \frac{2}{n^2+12}$

- Is the series convergent or divergent?

A Convergent

B Divergent

Q5:

- Find the partial sum for the series $\sum_{n=1}^{\infty} 3\,(2)^{n-1}$.

A $S_n = 6$

B $S_n = \frac{1}{6}$

C $S_n = -3\,(2^n - 1)$

D $S_n = 3\,(2^n - 1)$

E $S_n = 3\,(2)^n$

Is the series convergent or divergent?

A Convergent

B Divergent

Q6: Use the sequence of partial sums to determine whether the series $\sum_{n=1}^{\infty} \frac{n}{n+1}$ converges or diverges.

A It converges.

B It diverges.

Q7: Use the sequence of partial sums to determine whether the series $\sum_{n=1}^{\infty} \frac{1}{n+1}$ converges or diverges.

A It diverges.

B It converges.

Q8: Write the expression $2+1+\frac{2}{3}+\frac{1}{2}+\frac{2}{5}+\cdots$ as an infinite series using sigma notation.

A $\sum_{n=1}^{\infty} \frac{1}{n!}$

B $\sum_{n=1}^{\infty} \frac{n}{2}$

C $\sum_{n=1}^{\infty} \frac{2}{n!}$

D $\sum_{n=1}^{\infty} \frac{2}{n}$

E $\sum_{n=1}^{\infty} \frac{2}{n+1}$

Q9: Write the expression $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\cdots$ as an infinite series, using sigma notation.

A $\sum_{n=1}^{\infty} \frac{1}{n}$

B $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$

C $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$

D $\sum_{n=1}^{\infty} \frac{-1}{n}$

E $\sum_{n=1}^{\infty} \frac{(-1)^{n-2}}{n}$

Q10: Evaluate the sequence of partial sums S_k for the series $\sum_{n=1}^{\infty} \frac{2}{n(n+1)}$.

A $\frac{k+2}{k+1}$

B $\frac{2k}{k-1}$

C $\frac{k}{2k+2}$

D $\frac{2k}{k+1}$

E $\frac{k}{k+1}$