Problem Set 19 11.2: Series

Please indicate the members who are present. Also indicate the group coordinator.

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The geometric series $\sum_{n=1}^{\infty} ar^{n-1} = a + ar + ar^2 + \cdots \text{ converges if } |r| < 1 \text{ and its sum is } \sum_{n=1}^{\infty} ar^{n-1} = \frac{a}{1-r}, |r| < 1$

if $|r| \ge 1$, the geometric series is divergent.

Divergence Test If $\lim_{n\to\infty} a_n$ does not exist or if $\lim_{n\to\infty} a_n \neq 0$, then the series $\sum_{n=1}^{\infty} a_n$ is divergent.

The harmonic series $\sum_{n=1}^{\infty} \frac{1}{n}$ is divergent.

$$\sum_{n=1}^{\infty} a_n = a_1 + a_2 + a_3 + \cdots = \lim_{n \to \infty} \left(\sum_{i=1}^{n} a_i \right) = 5$$

$$\sum_{n=1}^{\infty} a_n = 5$$
Sequence of partial sums

$$S_1 = q_1 - \frac{1-8}{5+3} / \frac{5}{5} = q_1 + q_2 = \frac{1-8}{5+3} / \frac{5}{5} = q_1 + q_2 = \frac{1-8}{5} = \frac{1-$$

The sequence $\underline{s}_n = \frac{n^2 - 8}{5n^2 + 3}$ is the sequence of partial sums of the series $\sum_{n=1}^{\infty} a_n$. Does this series converge or diverge? If it is convergent, find its sum.

$$\lim_{N\to\infty} S_N = \lim_{N\to\infty} \frac{N^2 - 8}{5N^2 + 3} = \frac{1}{5}$$

$$\lim_{N\to\infty} S_N = \frac{1}{5}$$
Converged

$$\frac{\frac{1}{3} + \frac{2}{9} + \frac{1}{27} + \frac{2}{81} + \frac{1}{243} + \frac{2}{729} + \cdots}{\frac{1}{3} + \frac{1}{27} + \frac{1}{243} + \cdots} = \sum_{N=0}^{3} \frac{1}{3} \left(\frac{1}{9}\right)^{N}$$

$$= \frac{\frac{1}{3}}{1 - \frac{1}{9}} = \sum_{N=0}^{3} \frac{1}{3} \left(\frac{1}{9}\right)^{N}$$

$$= \frac{\frac{1}{3}}{1 - \frac{1}{9}} = \frac{3}{8}$$

$$= \frac{\frac{1}{3}}{\frac{3}{9}} = \frac{3}{8}$$

$$= \frac{3}{9} = \frac{3}{9} = \frac{3}{8}$$

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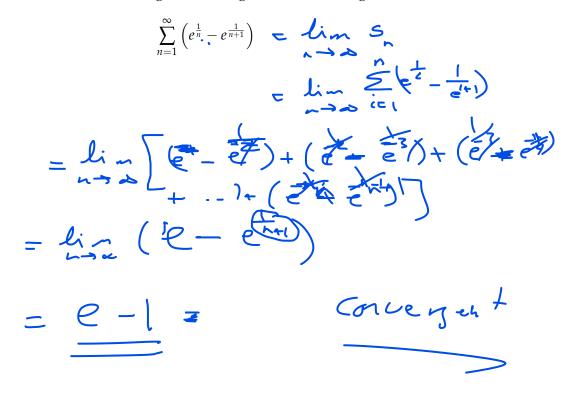
$$= \frac{3}{9} = \frac{3$$

$$\lim_{n=1}^{\infty} \frac{2+n}{1-2n}$$

$$\lim_{n\to\infty} \frac{2+n}{1-2n} = \frac{1}{2} + 0$$

$$\sum_{n=2}^{\infty} \frac{1}{n^3 - n} = 0$$

$$\sum_{n=2}^{\infty} \frac{1}{n^3 - n} =$$



Express the number as a ratio of integers $0.\overline{8} = 0.8888...$

$$0.8 = \frac{8}{10} + \frac{8}{100} + \frac{8}{100} + \cdots$$

$$= \frac{8}{100} \frac{8}{100} + \frac{8}{100} + \cdots$$

If the *n*th partial sum of a series $\sum_{n=1}^{\infty} a_n$ is

$$s_n = \frac{n-1}{n+2}$$

find a_n and $\sum_{n=1}^{\infty} a_n$.

$$S_{n} = q_{1} + q_{2} + \cdots + q_{n}$$

$$S_{n-1} = q_{1}$$

$$S_{n-1} = q_{n}$$

$$S_{n-1} = q_{n}$$

$$\sum_{n=1}^{8} q_{n} = \sum_{n=1}^{8} \frac{3}{(n+1)(n+2)} = \lim_{n \to \infty} \sum_{n=1}^{8} \frac{1}{(n+1)(n+2)}$$