Daily Quiz

- Go to Socrative.com and complete the quiz.
- Room Name: HONG5824
- Use your full name.

Reminders

- Take-home Quiz 2 is due in two weeks, October 19th.
- The second exam is on October 22nd.

8.2 Geometric Series

Consider the **geometric <u>sequence</u>** $\{ar^n\}$. The series

$$\sum_{n=0}^{\infty} ar^n = a + ar + ar^2 + \cdots$$

is called the **geometric <u>series</u>** with common ratio r and initial value a.

8.2 Geometric Series

The geometric series

$$\sum_{n=0}^{\infty} ar^n = a + ar + ar^2 + \cdots$$

is **convergent** if $|r| < 1$ and its sum is

$$\sum_{n=0}^{\infty} ar^n = \frac{a}{1-r} \quad |r| < 1$$

If $|r| \geq 1$, the geometric series is **divergent.**

8.2 Geometric Series

Determine whether the series below converges or diverges. If it is convergent, find its sum.

$$\frac{9}{10} + \frac{9}{100} + \frac{9}{1000} + \cdots$$

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Determine whether the series below converges or diverges. If it is convergent, find its sum.

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

8.2 Geometric Series

V EXAMPLE 4 Expressing a repeating decimal as a rational number

Write the number $2.3\overline{17} = 2.3171717\ldots$ as a ratio of integers.

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8.2 Geometric Series

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Find the sum of the geometric series

$$5 - \frac{10}{3} + \frac{20}{9} - \frac{40}{27} + \cdots$$

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Is the series $\displaystyle\sum_{n=1}^{\infty} 2^{2n}3^{1-n}$ convergent or divergent?

8.2 Geometric Series

For what values of x does the series $\displaystyle\sum_{n=0}^{\infty} \frac{(x+5)^n}{3^n}$ converge?

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8.2 Sums of Series

8 **Theorem** If $\Sigma\, a_n$ and $\Sigma\, b_n$ are convergent series, then so are the series $\Sigma\, ca_n$ (where c is a constant), $\Sigma\, (a_n + b_n)$, and $\Sigma\, (a_n - b_n)$, and

(i) $\displaystyle\sum_{n=1}^{\infty} ca_n = c \sum_{n=1}^{\infty} a_n$

(ii) $\displaystyle\sum_{n=1}^{\infty} (a_n + b_n) = \sum_{n=1}^{\infty} a_n + \sum_{n=1}^{\infty} b_n$

(iii) $\displaystyle\sum_{n=1}^{\infty} (a_n - b_n) = \sum_{n=1}^{\infty} a_n - \sum_{n=1}^{\infty} b_n$

8.2 Sums of Series

Find the sum of the series $\displaystyle\sum_{n=1}^{\infty}\left(\frac{3}{n(n+1)}+\frac{1}{2^n}\right)$.