408L CLASS PROBLEMS

APRIL 3RD, 2020

Problem 1.

(1) Find \( \sum_{n=1}^{\infty} \frac{1}{2^n} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots \)

(2) Draw a segment of length \( \frac{1}{2} \), then one of length \( \frac{1}{2} + \frac{1}{4} \), then one of length \( \frac{1}{2} + \frac{1}{4} + \frac{1}{8} \). How do these pictures relate to your answer to (1)?

Problem 2. Find \( \frac{6}{5} + \frac{18}{25} + \frac{54}{125} + \frac{162}{625} + \ldots \).

Problem 3. Find \( .99999\ldots = \sum_{n=1}^{\infty} 9 \cdot \left( \frac{1}{10} \right)^n \) by evaluating the geometric series.

Problem 4. Find \( \sum_{n=2}^{\infty} \frac{1}{n^2-1} \).

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\(^1\)The sum begins at 2 not to be tricky, but to avoid dividing by zero.