

**Read each question carefully and be sure to SHOW ALL WORK. Correct answer without proper justification will not receive a “Complete” grade. Pac fat! Good luck!**

Name: \_\_\_\_\_

**LO 6. Series [CORE].** I can extract information about series and their corresponding sequences of partial sums.

**Criteria for Success:** I can

- convert a series between expanded notation and sigma notation
- determine the sequence of partial sums for a given series
- find exact formulas for sequences of partial sums of arithmetic, geometric, and telescoping series
- determine the sum of a series from the definition as the limit of its partial sum
- use the formulas for both the finite and infinite sum of geometric or telescoping series

**Question:** Consider the series  $\sum_{k=0}^{\infty} \frac{3^k + 1}{3^k}$ .

(a) Write the series in expanded notation.

(b) Find the sum  $S_{100} = \sum_{k=0}^{99} \frac{3^k + 1}{3^k}$  of its first 100 terms (i.e., the 100-th partial sum), and then find an exact formula for the  $N$ -th partial sum for any whole number  $N$ . **Hint:** The two formulas should match when  $N = 100$ .

$S_{100} =$

Exact Formula:

(c) Use the exact formula to determine if the series converges or diverges directly from the limit definition, without using any tests of convergence/divergence. If it converges, find the value it converges to.

**LO 7. Series Tests [CORE].** I can determine convergence or divergence of a series by selecting an appropriate convergence test and applying it.

**Criteria for Success:** I can

- select and apply an appropriate convergence test: nth-term (divergence), geometric series, integral, comparison, limit comparison, p-series, alternating series, ratio, root, or absolute convergence
- distinguish between an absolutely convergent, conditionally convergent, or divergent series.

**Question:** Clearly state the name of the convergence/divergence tests you're using, and check that their conditions are satisfied. The series  $\sum_{k=0}^{\infty} (-1)^k \frac{3^k + 1}{3^k}$  is

- (a) absolutely convergent
- (b) conditionally convergent
- (c) divergent.