

Mild

Question 1

Evaluate:

$$\sum_{k=0}^4 \frac{2k-1}{2k+1}$$

Question 2

Evaluate:

$$\sum_{k=2}^{\infty} \frac{1}{3} \left(-\frac{1}{2}\right)^k$$

Question 3

Evaluate:

$$\sum_{k=9}^{582} \left(\frac{1}{2}k + 6\right)$$

Question 4

Express the following in sigma notation and find the sum.

$$7\pi + \frac{22}{3}\pi + \frac{23}{3}\pi + 8\pi + \cdots + \frac{922}{3}\pi$$

Question 5

Consider the sequence, b_n , defined recursively as follows: $b_1 = 3$, $b_2 = 2$, and $b_n = \frac{b_{n-1}}{b_{n-2}}$

- a. Complete the table below:

b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	b_9
3	2				$\frac{3}{2}$			

- b. Using your work from part (a), evaluate the series below.

$$\sum_{n=7}^{73} b_n$$

Medium

Question 1

The fifth term of an arithmetic sequence is **-22** and the fiftieth term of the sequence is **101**. Determine the eightieth partial sum of this sequence.

Question 2

The third term of a geometric sequence is **2** and the ninth term of the sequence is **54**. Determine the twentieth partial sum of this sequence.

Question 3

An architect designs a theater with 15 seats in the first row, 18 seats in the second row, 21 seats in the third row, and so on. If the theater is to have a seating capacity of 870, how many rows must the architect use in her design?

Question 4

Express the repeating decimal **0.123123123123** ... as a fraction by first writing it as the sum of an infinite geometric series and then evaluating what it converges to.

Question 5

A sequence has the property that each number in the sequence is 2 more than twice the previous number. The first four numbers in the sequence add up to 202. What is the 5th number in this sequence?

Spicy

Question 1

The sum of the first *eight* terms in an *arithmetic* sequence, a_n , is 28, and the sum of the first twelve terms in a_n is -30 . Determine an explicit formula for the arithmetic sequence, a_n .

Question 2

The sum of the first *five* terms in a *geometric* sequence, g_n , is 1210, and the value of its *infinite* series is 1215. Determine an explicit formula for g_n .

Question 3

The 12th term of an arithmetic sequence, a_{12} , is twice as large as the 4th term in the sequence, a_4 .

- Given $a_{14} = 27$, find the value of a_1 .
- Find the 20th partial sum of this sequence.

Question 4

The 20th partial sum of an arithmetic sequence is 1070. The sum of its fifth term and its tenth term is 65.

- Write an expression for the n^{th} term of this sequence.
- Find the 30th partial sum of this sequence.

Question 5

An infinite geometric series has a sum of 2005. A new series, obtained by squaring each term of the original series, has 10 times the sum of the original series. What is the common ratio of the original series?