

Math 1220 #17.5

Sequence and Series Review

A **sequence** $\{a_n\}$ is a function such that the domain is the set of positive integers and the range is a set of real numbers.

Write five terms for each of these sequences:

$$a_n = \frac{n}{2n + 1}$$

$$a_n = \frac{(-2)^n}{n!}$$

A **series** is the sum of a sequence. $\sum_{k=1}^n a_k$

A **partial sum** is the sum of the first n terms.

An **infinite sum** is the sum from $k = 1$ to ∞ .
Find these partial sums:

$$\sum_{k=0}^3 \frac{(-2)^k}{k!}$$

$$\sum_{k=1}^5 \frac{k}{2k + 1}$$

Arithmetic Sequence, Series

Geometric Sequence, Series

Arithmetic Sequence, Series	Geometric Sequence, Series
$d = \text{common difference}$ $a_n = a_1 + (n - 1)d$	$r = \text{common ratio}$ $a_n = a_1 r^{(n-1)}$

Partial sums:

- $\sum_{k=1}^n (a_1 + (k - 1)d) \quad S_n = \frac{n}{2}(a_1 + a_n)$

- $\sum_{k=1}^n a_1 r^{k-1} \quad S_n = a_1 \frac{1-r^n}{1-r}$

Infinite sum:

$$\sum_{k=1}^{\infty} a_1 r^{k-1} \quad S_{\infty} = \frac{a_1}{1-r}$$

Determine the sum for each of these:

$$\sum_{k=1}^{50} 2k - 3$$

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

Common Elements of Sequences/Series:

Odd numbers

Even numbers

Factorials

Alternating signs

Powers of 2

Arithmetic, Geometric or Neither?

	n^{th} term	20^{th} term	$a_n \rightarrow 0?$	$\sum_{k=1}^{\infty} a_k \rightarrow \text{some value?}$
1,1,2,3,5,8,13, ...				
$a_1 = 2, a_{n+1} = \frac{a_n}{n}$				
$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$				
.9, .09, .009, .0009, ...				

Write a formula for the n^{th} term of these sequences.

$$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \dots$$

$$\frac{1}{2}, \frac{1}{4}, \frac{1}{16}, \frac{1}{256}, \dots$$

$$\frac{-2}{1}, \frac{8}{2}, \frac{-26}{6}, \frac{80}{24}, \frac{-242}{120}$$