**Math 120  
8.1 Sequences and Summation Notation**

# **Objectives:**

1. Find particular terms of a sequence given the equation for the general term.

# **Topic #1: Sequences**

*Introduction to Sequences*

A sequence is a string of numbers that follow a pattern or a rule to get from one term to the next. Consider the sequence:

The first term is , the second , the third , the fourth , and so on. To get the next term, the pattern suggests to “add ”. The sequence goes on forever and is an

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Suppose that we were only interested in the first ten terms:

This is now a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** since there are a fixed number of terms (specifically, terms).

*Definition of a Sequence*

The terms of a sequence are a function of their position along the sequence. The first term is denoted as and occurs when , the second term is and occurs when , and so on. This gives the formal definition of an infinite sequence:

where is the term and is a positive integer.

Each term is a function of its position along the sequence.

The domain is the set of positive integers and the range are the associated terms .

The terms of the sequence:

can be defined as , giving any term along the sequence as a function of its position:

when

when

when

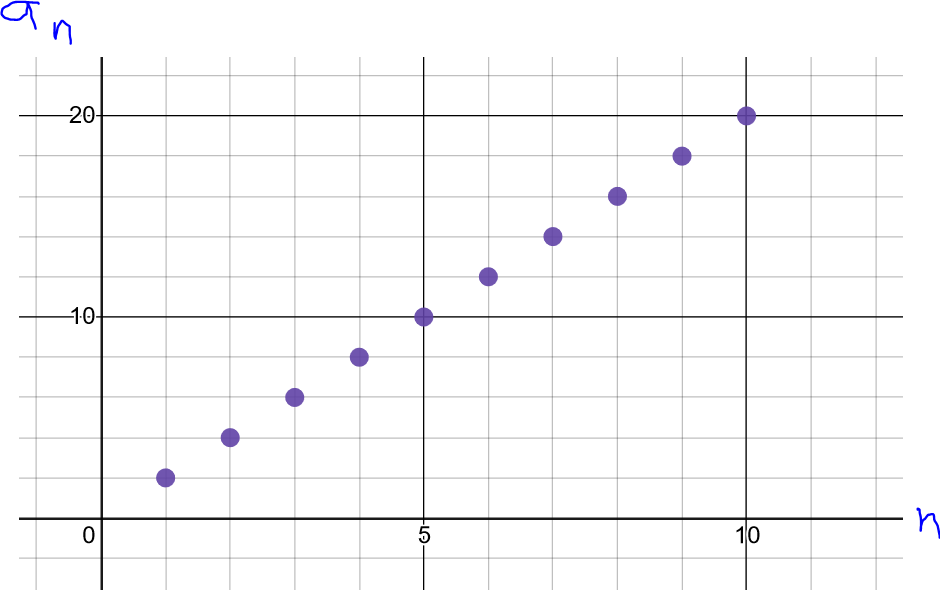
when

Using the rule, the 99th term in the sequence is:

Note that we cannot evaluate the term of the sequence unless is a positive integer (also called a counting/natural number).

For example, values such or is out of the domain since they are not counting numbers.

Here is a graph of the first ten terms of the sequence from the previous page. Notice that the domain is only and there are gaps between each term.



*Example #1* – Write the First 4 Terms of the Sequence

a)

Plug in each position into the definition to get its term:

when

when

when

when

Notice the next term is 5 more than the previous term.

b)

Plug in each position into the definition to get its term:

when

when

when

when

Notice the next term is 3 times the previous term.

c)

when

when

when

when

Notice the terms alternate between negative/positive and next term is times the previous term.

d)

when

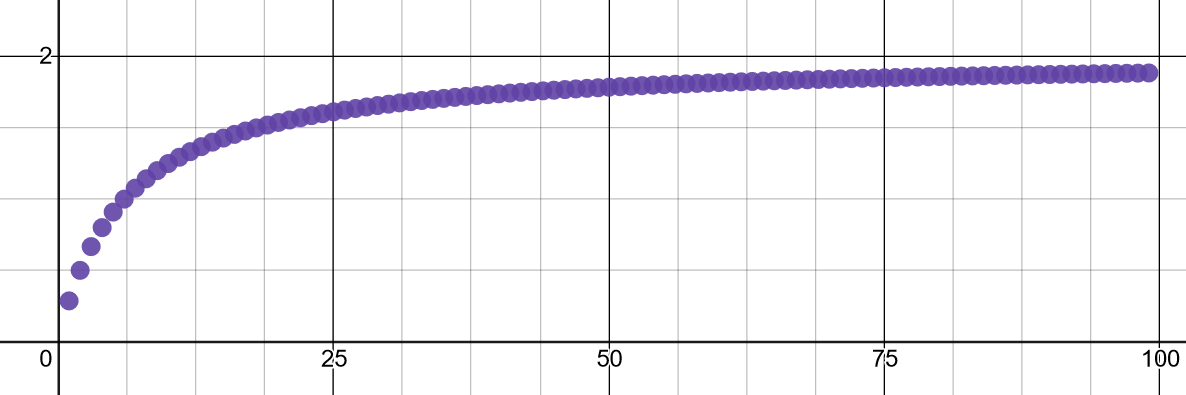
when

when

when

This is another alternating sequence.

Plug in each position into the definition to get its term**:**



A graph of the first 100 terms shows they approach the value as gets bigger.