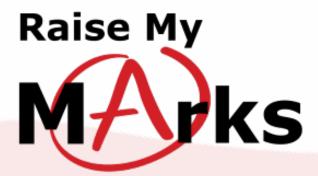
Arithmetic Sequences



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Sequences

There are two types of sequences we will consider, arithmetic and geometric. Regardless of the type of sequence, we will call the general term of the sequence t_n and the first term, $t_1 = a$. The value n is the position of the term in the sequence. When writing the term of a sequence, there are two ways: A formula for the general term t_n in terms of n and a recursive formula for t_n that involves the previous, t_{n-1} term. Let's start with arithmetic sequences.

Arithmetic sequences

An **arithemic sequence** can be thought of a sequence of numbers where the next number, or term, in the sequence, is the previous value or term plus a fixed value, d, say. Let's consider a few examples to see this idea explicitly.

$$S_1 = 1, 3, 5, 7, 9, 11, 13, 15, \dots$$

 $S_2 = 2, 7, 12, 17, 22, 27, 32, 37, \dots$
 $S_3 = 6, 3, 0, -3, -6, -9, -12, -15, \dots$

If we look at the three arithmetic sequences above in greater detail we see that for,

sequence S_1 , the sequence starts at 1 and each term is increasing by 2; sequence S_2 , the sequence starts at 2 and each term is increasing by 5; sequence S_3 , the sequence starts at 6 and each term is decreasing by -3.

We call the value that the sequence starts at a and the amount that the sequence changes by d. The general term for an arithmetic sequence is given by,

$$t_n = a + (n-1)d$$

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The recursive formula for an arithmetic sequence is given by,

$$t_n = t_{n-1} + d$$

Exercises

Given a and d below, write out the first 6 terms of the arithmetic sequences.

a)
$$a = 0, d = 2$$

f)
$$a = -3$$
, $d = 1/2$

b)
$$a = 3, d = 3$$

g) =
$$-a = 2$$
, $d = 2/3$

c)
$$a = -2, d = -4$$

h)
$$a = 4$$
, $d = -3/4$

d)
$$a = 1, d = -1$$

i)
$$a = 1/2, d = 6$$

e)
$$a = -1, d = 1$$

j)
$$a = 3/4$$
, $d = -10$