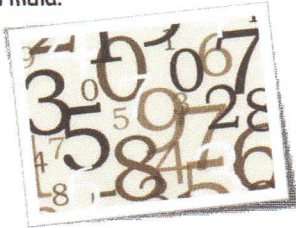


Recursion Formula (Lesson Notes).notebook

UNIT #7: Sequences and Series Recursion Formula

Learning Goal:

I will learn how to write terms of a sequence given a recursion formula.



Lesson: Recursion Formula

A sequence can be calculated without knowing previous terms.

Example:

$$t_n = 2n + 3$$

$$t_{100} = 2(100) + 3 = 203$$

These are known as **explicit formulas**.

However, with **Recursion Formula**, the value of a term depends on value(s) of one or more previous terms.

A Recursion Formula has two parts:

1. Value of the first term (t_1)
2. An equation that can be used to calculate the other terms.

$$t_5 = t_4 - 4$$

$$t_5 = -1 - 4$$

$$t_5 = -5$$

\therefore first 5 terms are: 11, 7, 3, -1, -5
 $a = 11$, $d = -4$

Example 1:

Writing an Arithmetic Sequence from a Recursion Formula

$$t_n = t_{n-1} - 4$$

Write the first 5 terms.
 $t_1 = 11$

$$t_2 = t_{2-1} - 4$$

$$t_2 = t_1 - 4$$

$$t_2 = 11 - 4$$

$$t_2 = 7$$

$$t_3 = t_2 - 4$$

$$t_3 = 7 - 4$$

$$t_3 = 3$$

$$t_4 = t_3 - 4$$

$$t_4 = 3 - 4$$

$$t_4 = -1$$

We can determine the explicit formula for the above sequence.

$$t_n = 11 + (n-1)(-4)$$

$$t_n = 15 - 4n$$

OR $f(n) = 15 - 4n$

Example 2:

Writing a Geometric Sequence from a Recursion Formula

$$t_n = -3t_{n-1}$$

$$t_1 = 2$$

Find terms 2 to 5 of the sequence determined by the recursion formula.

$$t_2 = -3t_{2-1}$$

$$t_2 = -3t_1$$

$$t_2 = -3(2)$$

$$t_2 = -6$$

$$t_3 = -3t_2$$

$$t_3 = -3(-6)$$

$$t_3 = 18$$

$$t_4 = -3t_3$$

$$t_4 = -3(18)$$

$$t_4 = -54$$

$$t_5 = -3t_4$$

$$t_5 = -3(-54) = 162$$

First terms are: 2, -6, 18, -54, 162

$$a = 2, r = -3$$

$$t_n = 2(-3)^{n-1}$$

OR $f(n) = 2(-3)^{n-1}$

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UNIT 7: Sequences and Series

Recursion Formula

Learning Goal:

I will learn how to write terms of a sequence given a recursion formula.

Success Criteria:

To be successful, I must be able to...

- describe the difference between a recursion formula and explicit formula
- describe how finding the n th term of a sequence using an explicit formula is different than using a recursion formula
- use the recursion formula to write the first terms of a sequence
- write an explicit formula for the sequence determined by the recursion formula

Practice Work

p. 461 # 1 - 5 e.o., 10 - 12, 13a