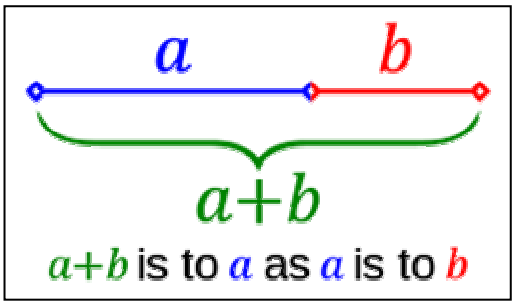
Sequences and Series – Recursive and Special Sequences

Specific Sequence # 3 – Fibonacci Sequence

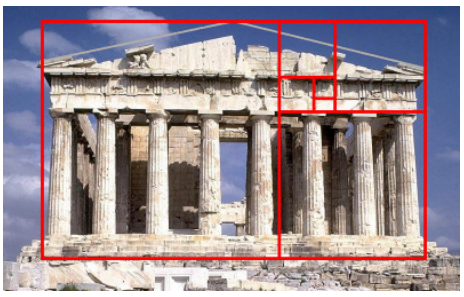
The following terms are in the Fibonacci Sequence → 1 , 1 , 2 , 3 , 5 , 8 , 13 , 21 , 34 , 55 , 89 , __?__ …

- What is the pattern to this sequence? _____
- What is the missing term (value of the ?) to this sequence? _____
- The Golden Ratio is a phenomena that is associated with the Fibonacci Sequence →

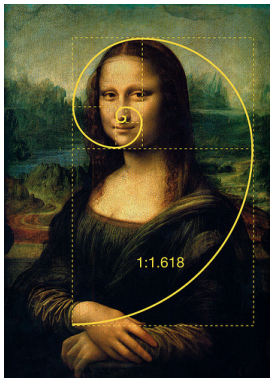


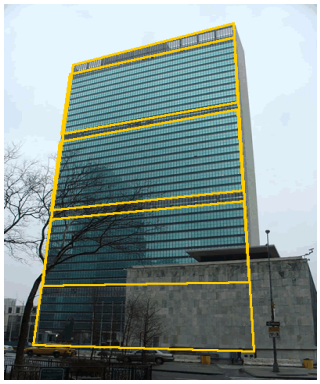
The Golden Ratio actually equals a specific number, let's figure it out:

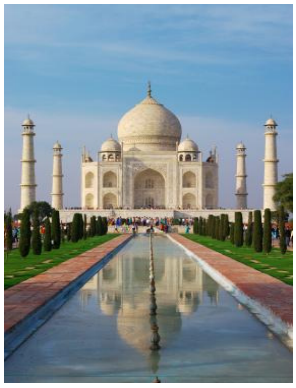
- Both the Fibonacci Sequence and the Golden Ratio occur naturally and humanly in the real world:







Specific Sequence # 4 – Recursive Sequence (Formula)

- **recursive sequence** → a sequence that uses a _____

where the sequence is neither consistently adding/subtracting (like arithmetic sequences)

nor is the sequence consistently multiplying/dividing (like geometric sequences)

Note: The following are examples of recursive sequences → $a_n = 2a_{n-1} + 5$ or $a_{n+1} = 2a_n + 5$

Example 1: Find the first five terms of the given sequence.

a.) $a_{n+1} = 3a_n - 2$; $a_1 = 4$	b.) $a_n = -2\,(a_{n-1} + 6)$; $a_1 = 3$	c.) $a_{n+1} = 4a_n + 2n$; $a_1 = 5$

Example 2: Complete the word problem below using recursive sequences.

Caleb discovered that there were 225 dandelions in his garden on the first Saturday of spring. He had time to pull out 100, but by the next Saturday, there were twice as many as he had left. Each Saturday in spring, he removed 100 dandelions, only to find that the number of remaining dandelions had doubled by the following Saturday.

a.) Write a recursive formula for the number of dandelions Caleb finds in his garden each Saturday.	b.) Find the number of dandelions Caleb would find on the fourth Saturday.

- iteration → the process of _____

Example 3: Find the first three terms x_1 , x_2 , and x_3 of the function f (x) = 2x + 3 where $x_0 = 1$.