

Main topic

How large will # of the steps of the algorithm be?
In what situation will # of steps will be large?

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Definitions of terms

1 about the Euclid's algorithm

the number of steps ... How many times the numbers are divided in the Euclid's algorithm.

x ... a ratio of the number of digits of b to the number of steps.

$$x = \frac{\text{the number of steps.}}{\text{the number of digits of } b}$$

$F(a, b)$... the number of steps needed by the Euclid's algorithm to process a and b .

Q. What is the Euclid's algorithm?

A. One method for finding the greatest common divisor!

e.g. lets find Gcd(150,108)!

Quotients

# of step is 5	1	$150 \div 108 = 1$	$R = 42$	$\rightarrow 150 = 1 * 108 + 42$
	2	$108 \div 42 = 2$	$R = 24$	$\rightarrow 108 = 2 * 42 + 24$
	3	$42 \div 24 = 1$	$R = 18$	$\rightarrow 42 = 1 * 24 + 18$
	4	$24 \div 18 = 1$	$R = 6$	$\rightarrow 24 = 1 * 18 + 6$
	5	$18 \div 6 = 3$	$R = 0$	$\rightarrow 18 = 3 * 6 + 0$

Let $a, b (a > b)$ be
processed by the algorithm

Gcd
(150,108)

When the remainder is 0, then divisor is gcd(a,b)!

Hi everyone!
I'm Εὐκλείδης (Euclid)



2 about the Fibonacci series

Q. What is the Fibonacci series?

A. It's the series of numbers: 1, 1, 2, 3, 5, 8, 13, ...

The next number is found by adding up the two numbers before it.

e.g. $1 + 1 = 2$ ($f_1 + f_2 = f_3$)

$1 + 2 = 3$ ($f_2 + f_3 = f_4$)

$2 + 3 = 5$ ($f_3 + f_4 = f_5$)

$3 + 5 = 8$ ($f_4 + f_5 = f_6$)



$$f_{n-2} + f_{n-1} = f_n$$

$$f_n = \frac{1}{\sqrt{5}} \left(\left(\frac{1 + \sqrt{5}}{2} \right)^n - \left(\frac{1 - \sqrt{5}}{2} \right)^n \right)$$

How are you?
I'm Fibonacci.

