A Closer Look at Recursion

Prerequisite: Function

Find more contents at
https://sites.google.com/view/cse105june18/home

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Recursion is not confined to CS

Source: https://www.allabandoned.com/palisades-centers-privates/recursive-self-portrait/

Recursion is not confined to CS

Recursion in Math

5! = 5 * (5-1)!

5! = 5 * 4 * (4-1)!

5! = 5 * 4 * 3 * (3-1)!

5! = 5 * 4 * 3 * 2 * (2-1)!

5! = 5 * 4 * 3 * 2 * 1! (the base case)

5! = 5 * 4 * 3 * 2 * 1

Recursion in Math

factorial(4) = 4 * factorial (3)
= 4 * (3 * factorial (2))
= 4 * (3 * (2 * factorial (1)))
= 4 * (3 * (2 * (1 * factorial (0))))

Expansion phase

= 4 * (3 * (2 * (1 * 1)))
= 4 * (3 * (2 * 1))
= 4 * (3 * 2)
= 4 * 6
= 24

Substitution phase

Find the factorial of n

Write the C code and draw the function calls for n = 5

Find the number of digits in a number

For example,

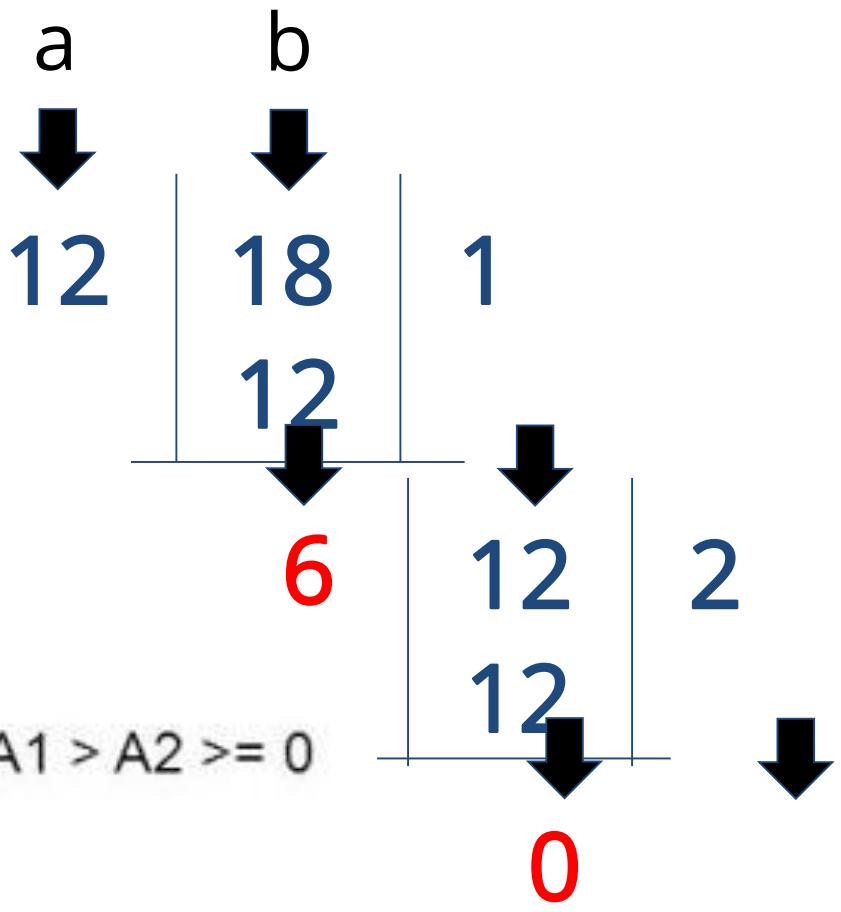
1234 has four digits
10 has 2 digits
1 has 1 digit
0 has ?

Find the sum of digits in a number

Find the sum of the following series

1 – 2 + 3 – 4 + … … … up to n

Finding GCD using Euclidean algorithm



To find the gcd of numbers A1 and A2 with A1 > A2 >= 0

a. If A2 = 0 then gcd = A1

b. If A2 > 0 then A1 = A2 q2 + A3 with A2>A3 >=0

c. Replace A1 by A2, A2 by A3 and go to step a.

Source: http://www.allivideo.info/euclids-algorithm-for-gcd/