ALGORITHM

A sequence of unambiguous instructions for solving a problem

Properties of an algorithm:

1. Definite : Each step must be unambiguously specified
2. Effective : Each step is sufficiently simple and basic.
3. Finite : Terminates after a finite number of steps
4. Input : Valid inputs are clearly specified
5. Output : Can produce the correct output for a given valid input.

Theoretical Importance of algorithms:

It is the core of Computer Science.

Practical Importance of algorithms:

- Searching & Sorting
- GPS, Air travel routes, page ranking, etc.

Problem : Find the GCD of 'm' and 'n'

Method-1

ALGORITHM EUCLID(m, n)

while $n \neq 0$ do

$r \leftarrow m \bmod n$

$m \leftarrow n$

$n \leftarrow r$

return m

eg $m = 60$

$n = 24$

$r \Rightarrow 60 \bmod 24 = 12$

$m \Rightarrow 24$

$n \Rightarrow 12$

$r \Rightarrow 24 \bmod 12 = 0$

$m \Rightarrow 12$

$n \Rightarrow 0$ STOP

GCD of 60 & 24 is 12

Method-2 : Consecutive Integer Checking Algorithm GCD(m, n)

Step1: Assign min(m, n) to 't'

Step-2: Divide m by t. If the remainder is 0, go to Step-3. If the remainder is non-zero, go to Step-4.

Step-3: Divide n by t. If the remainder is 0, then return 't' as the GCD of m and n; otherwise go to Step-4

Step-4: Decrease the value of 't' by 1. Go to Step-2.

eg GCD(60, 24)

t = 24

60 mod 24 = 12

t = 23

60 mod 23 ≠ 0

t = 22

60 mod 22 ≠ 0

t = 21

60 mod 21 ≠ 0

t = 20

60 mod 20 = 0

24 mod 20 = 4 ≠ 0

t = 19

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