

Department of Mathematics and Computer Science

2301365 Algorithm Design and Analysis

Lab #1

Name นาย ธรรม ศรีสวัสดิ์ StudentID 6434439723

In this lab, write a program of FindGCD1, FindGCD2 and FindGCD3. Identify the basic operation of each step and add instructions to count the number of times the operations are executed.

FindGCD1(m,n)

Step 1 Find the prime factorization of m

Step 2 Find the prime factorization of n

Step 3 Find all the common prime factors

Step 4 Compute the product of all the common prime factors and return it as $\text{gcd}(m,n)$

Where the **prime factorization** technique is implemented by a **Naive solution**.

FindGCD2(m,n)

Step 1 Find the prime factorization of m

Step 2 Find the prime factorization of n

Step 3 Find all the common prime factors

Step 4 Compute the product of all the common prime factors and return it as $\text{gcd}(m,n)$

Where the **prime factorization** technique is implemented by **Sieve of Eratosthenes**.

FindGCD3(m,n)

if $m > n$, then $\text{GCD}(m, n) = \text{GCD}(m \% n, n) = \text{GCD}(m, m \% n)$

if $m = n$, then $\text{GCD}(m, n) = m = n$

if $m < n$, then $\text{GCD}(m, n) = \text{GCD}(m, n \% m) = \text{GCD}(n \% m, n)$

