# LCD, GCD, and Bezout's Theorem

## 1 Euclid's Algorithm

**Euclid's Algorithm for finding GDC is as follows:**

$$\begin{aligned} gcd(0, n) &= n \\ gcd(m, n) &= gcd(n\%m, m) && \text{for any } m > 0 \end{aligned}$$

**Calculate the following GCD's using Euclid's Algorithm, show steps:**

1. $gcd(3, 9)$
2. $gcd(0, 24)$
3. $gcd(436, 559)$
4. $gcd(5, 525)$
5. $gcd(123456789, 123456790)$

## 2 Proofs regarding gcd and lcm

**Recall the definition of** $fib(n)$

$$\begin{aligned} fib(0) &= 0 \\ fib(1) &= 1 \\ fib(k^{\frown\frown}) &= fib(k^{\frown}) + fib(k) \end{aligned}$$

**Construct a table of the first 10 values for the following algorithm:**

6. $gcd(fib(n^{\frown}), fib(n))$

**Prove the Following:**

7. $gcd(fib(n^{\frown}), fib(n)) = 1$ for any $n \in \mathbb{N}$
8. $n \cdot m = gcd(n, m) \cdot lcm(m, n)$