

INTRODUCTION TO NUMBER THEORY

EUCLID'S ALGORITHM:

{ on input a, b where
 a, b are \mathbb{Z} such
that $a \geq b \geq 0$ }

The algorithm follows three steps:

Step 1: If $b=0$, then return the value of a .

Step 2: Otherwise, divide a by b and store the remainder in some variable r .

[which is nothing but modulo operation]

Step 3: Let $b=r$ and $a=b$ and return to step.

Step 4: Continue this process until $b=0$.

FOR EXAMPLE:

Let us consider the inputs as

$$a = 25 \quad \boxed{b = 10}$$

$$r = a \% b \quad := r = 5$$

$$b = 5 \quad a = 10$$

$$r = a \% b \quad := r = 0$$

$$\boxed{b = 0} \quad a = 5$$

$$a \neq 0 \quad b \neq 0$$

$$r = a \% b \quad \neq$$

$$\therefore \gcd(25, 10) = a = 5$$

```
int gcd (int a, int b)
```

```
{ int r;
```

```
  if (b == 0)
```

```
    return a;
```

```
  else
```

```
    r = a % b; } a = b and b = r
```

```
    gcd(b, r); }
```

```
}
```