GCD or HCF of two numbers

Given two numbers. The task is to find the GCD of the two numbers.

In Python, the math module contains a number of mathematical operations, which can be performed with ease using the module. math.gcd() function compute the greatest common divisor of 2 numbers mentioned in its arguments.

```
Syntax: math.gcd(x, y)
Parameter:
x : Non-negative integer whose gcd has to be computed.
y : Non-negative integer whose gcd has to be computed.
Returns: An absolute/positive integer value after calculating
 the GCD of given parameters x and y.
Exceptions: When Both x and y are 0, function returns 0,
 If any number is a character, Type error is raised.
```

Python

```
# Python code to demonstrate the working of gcd()
# importing "math" for mathematical operations
import math

# prints 12
print("The gcd of 60 and 48 is : ", end="")
print(math.gcd(60, 48))
```

Output

```
The gcd of 60 and 48 is : 12
```

Using Euclidean Algorithm :

The Euclid's algorithm (or Euclidean Algorithm) is a method for efficiently finding the greatest common divisor (GCD) of two numbers. The GCD of two integers X and Y is the largest number that divides both of X and Y (without leaving a remainder).

Pseudo Code of the Algorithm-

1. Let a, b be the two numbers

2. a mod b = R
3. Let a = b and b = R
4. Repeat Steps 2 and 3 until a mod b is greater than 0
5. GCD = b
6. Finish

Python

```
# Recursive function to return gcd of a and b
def gcd(a, b):

    # Everything divides 0
    if (a == 0):
        return b
    if (b == 0):
        return a

    # base case
    if (a == b):
        return a

    # a is greater
    if (a > b):
        return gcd(a-b, b)
    return gcd(a, b-a)

# Driver program to test above function
a = 98
b = 56
if(gcd(a, b)):
    print('GCD of', a, 'and', b, 'is', gcd(a, b))
else:
    print('not found')
```

Output

```
GCD of 98 and 56 is 14
```

Using Optimised Euclidean Algorithm :

Python

```
def hcf(a, b):
    if(b == 0):
        return a
    else:
        return hcf(b, a % b)

a = 60
b = 48

# prints 12
print("The gcd of 60 and 48 is : ", end="")
print(hcf(60, 48))
```

Output

```
The gcd of 60 and 48 is : 12
```