① GCD (Greatest Common Divisor)

gcd(10,0) = 10

a = 10, b = 0, r = 0

→ 10

gcd(6,10) = 6

gcd(10,6) = 6

gcd(6,4) → 2

$f(n) = \begin{cases} n/2 & \text{if } n \equiv 0 \pmod 2 \\ 3n+1 & \text{if } n \equiv 1 \pmod 2 \end{cases}$

$f^{-1}(n) = \begin{cases} 2n & \text{if } n \equiv 0 \pmod 2 \\ \frac{n-1}{3} & \text{if } n \equiv 1 \pmod 3 \\ \text{NIL} & \text{otherwise} \end{cases}$

$f^{-1}(n) = \begin{cases} 2n & \text{if } n \equiv 0 \pmod 2 \\ \frac{n-1}{3} & \text{if } n \equiv 1 \pmod 3 \\ \frac{2n-1}{3} & \text{if } n \equiv 2 \pmod 3 \end{cases}$

$\frac{n-1}{3} > n$

$\frac{2n-1}{3} > n$

$n > 1$

$n > 2n$

$n > 2n$

$n > 1$

$n > 2$

② gcd(a,b) = lcm(a,b)

③ L.C.M. (Least Common Multiple)

$6 = 2 \times 3$

$8 = 2 \times 2 \times 2$

lcm(6,8) = 24

lcm(a,b) = a·b

$f(n) = \begin{cases} n/2 & \text{if } n \equiv 0 \pmod 2 \\ 3n+1 & \text{if } n \equiv 1 \pmod 2 \end{cases}$

$f^{-1}(n) = \begin{cases} 2n & \text{if } n \equiv 0 \pmod 2 \\ \frac{n-1}{3} & \text{if } n \equiv 1 \pmod 3 \\ \text{NIL} & \text{otherwise} \end{cases}$

$f^{-1}(n) = \begin{cases} 2n & \text{if } n \equiv 0 \pmod 2 \\ \frac{n-1}{3} & \text{if } n \equiv 1 \pmod 3 \\ \frac{2n-1}{3} & \text{if } n \equiv 2 \pmod 3 \end{cases}$

$\frac{n-1}{3} > n$

$\frac{2n-1}{3} > n$

$n > 1$

$n > 2$

④ GCD(a,b) × GCD(a,b) = a×b

$a = 6$, $b = 8$

lcm(6,8) = 24

lcm(6,8) = 48

gcd(6,8) = 2

$6 \times 8 = 48$

$24 \times 2 = 48$

⑤ Properties of GCD

① GCD(a,b) = GCD(b,a)

② GCD(a,0) = a

GCD(a,a)

③ GCD(a,1) = 1

④ GCD(a,a) = a

⑤ GCD(a,b) = GCD(a,b)

⑥ GCD(a,b+a) = GCD(a,b)

gcd(a,b) = gcd(a, b−a)

$a = k_1 d$, $b = k_2 d$

$b - a = (k_2 - k_1) d$

$\gcd(a, b-a) = d$

$b - a = (k_2 - k_1) d$

$b = (k_2 - k_1 + k_1) d$

$b = k_2 d$

gcd(a,b) = gcd(a, b−a)

gcd(a,b) = gcd(a, b−a)

gcd(a, b−a) = gcd(a, b−2a)

gcd(a, b−2a) = gcd(a, b−3a)

gcd(a, b−3a) = gcd(a, b−4a)

gcd(a, b−4a) = gcd(a, b−5a)

gcd(a, b−5a) = gcd(a, b−6a)

gcd(a, b−6a) = gcd(a, b−7a)

gcd(a, b−7a) = gcd(a, b−8a)

gcd(a, b−8a) = gcd(a, b−9a)

gcd(a, b−9a) = gcd(a,