Edu-81

Saturday, 13 March 2021 10:54

0 1 0 0 1 0

+1 0 +1 +2 +1 +2

[0, +2] +2

$rs = 1$

$mn = -2$ $mx = 3$

$x = 4$

$t_0 = \underline{1}$ ✓

$t_1 = 6$

$x = -4$

$mn = -1$

$mx = 2$

$rs = -1$

$\frac{x - mx}{rs} = \frac{-4-2}{-1} = 6$

$\frac{x - mn}{rs} = \frac{-4+1}{-1} = 3$

0	1	2	3	4	5	6	7
-2 3	-1 4	0 5	1 6	2 7	3 8	4 9	5 10
	✓	✓	✓	✓	✓	✓	

s t

$z = cnt$

s

1 1 1 1

z := z + 1

aabce

ace

t y

y y t

---

a m

$x \in [0, m)$

$\gcd(a, m) = \gcd(a + x, m)$

$a = 4$ $m = 9$

$\gcd(4, 9) = \gcd(4, 9)$ $x = 0$ always good

$\gcd(4, 9) = \gcd(5, 9)$

4 5 9

2^2 5 3^2

compute $\gcd(a, m) = p_1^{\alpha_1} \cdots p_n^{\alpha_n}$

$m = p_1^{\alpha_1+\beta_1} \cdots p_n^{\alpha_n+\beta_n} \cdot p_{n+1}^{\beta_{n+1}} \cdots p_{n+l}^{\beta_{n+l}}$

$a + X = p_1^{\alpha_1+\gamma_1} \cdot \ldots \cdot p_n^{\alpha_n+\gamma_n} \cdot p_{n+1}^{\gamma_{n+1}} \cdots p_{n+s}^{\gamma_{n+s}}$

$\Downarrow$

if $\beta_1 > 0$

$\gamma_1 = 0$

all those factors must be disjoint!

so we have a number of

forbidden factors:

1. all p_i s.t. $\beta_i > 0$
2. all $p_{n+1} \ldots p_{n+l}$

Also we need:

$0 \leq x < m$

i.e.

$a + x < a + m$

find all positive

$\boxed{a \leq v < a + m}$

s.t.

$v = \underbrace{p_1^{\alpha_1} \cdot \ldots \cdot p_n^{\alpha_n}}_{\text{original gcd}} \cdot$

Actually

$\frac{m}{\gcd(a, m)}$ = number of candidates

we only need to exclude numbers divisible by forbidden factors

New question:

- how many $v \in [x, y]$ s.t. $v \nmid p_i$ for $p_1, \ldots p_n$

$v \mid g$ $g = \gcd(a, m)$

4 9

$\gcd(4, 9) = 1$ forbidden: 3

9 candidates:

4 5 $\cancel{6}$ 7 8 $\cancel{9}$ 10 11 $\cancel{12}$

5 10 gcd = 5

1 candidate

5