R-709

Sunday, 21 March 2021 12:51

1 ... m days

n friends

each at most $\lceil \frac{m}{2} \rceil$ times

1 . . . . . m

1

1 2

3 3 3

4

greedy?

1 2

1
2 ×

---

playlist

1 ... n songs

genre

1
⋮
n

x
y ← if gcd(x,y) = 1 delete y

2 ← won't be deleted if y was deleted

$a_1 \; \ldots \; a_i \; a_{i+1} \; \ldots \; a_n$

$\gcd(a_i, a_{i+1}) = 1$

delete a_{i+1}

1 2 4 2 4 2

→ 1

2

finished when all numbers share a factor

1 normalize (we don't care about powers of factors, just their presence)

1 → $\cancel{2}$ 2 2 2 2

×

2 → 2·3 → 3·5 → 5·2 → 2

edge case: if all primes, everything but 1 deleted

5	3	2	10	15
5	3	2	10	15

2 → 3

1 2

2 2 2 2 2 7

7 7 7 7 7 $\overset{\times}{2}$

7 $\overset{\times}{2}$ 7 $\overset{\times}{2}$ 7 $\overset{\times}{2}$

2 $\overset{\times}{3}$ → $\underset{\times}{5}$ $\overset{\times}{7}$ → 9 $\overset{\times}{11}$

×

1 2 3

1

---

h_i all h_i different

1 b_i n

beauty +/-

photo = segment

partition into segments

beauty of a photo: beauty of a shortest building in it

compute max beauty

$3 \cdot 10^5$ 300,000

photo

DP:

1	4	3	2	5
-3	4	-10	2	7

2·3·5·7·...·11

2 3 5 7 11 13 17

$\underbrace{\quad}_{}$ 11 primes

11

$O(11 \cdot 10^5 \cdot \log 10^3)$

$\log 10^3 = 30$

$300 \cdot 10^5$ ✓

$3 \cdot 10^8$

2·3 $\overset{\times}{3}$ 3·5 100,000

2·3·5·7 2·3·5·7 $\overset{\times}{3}$ 5 7

2·3·5·7·11·13·17·19·23·29 10

10000

2 2

+8 +8 −11 +8 −11

1 9 17 6 14 3

c=8

1 9 17 } 25 33 41

x > 17

25 % x = 6
33 % x = 14
41 % x = 3

25 − 6 = 19
33 − 14 = 19
41 − 3 = 38 = 19·2

0 10^5 0 10^5 0

$c = 10^5$

$2 \cdot 10^5 \,\%\, x = 0$
$3 \cdot 10^5 \,\%\, x = 10^5$
$4 \cdot 10^5 \,\%\, x = 0$

$2 \cdot 10^5 - 0 = 2 \cdot 10^5$
$3 \cdot 10^5 - 10^5 = 2 \cdot 10^5$
$4 \cdot 10^5 - 0 = 4 \cdot 10^5 = 2 \cdot 2 \cdot 10^5$

1 1

c=0

1 % x = 1

∞

---

x → y → z

if gcd(x,y) ≠ 1

x y z

y will never be removed

why?

suppose x gets removed

p → $\cancel{x}$ → y → z

gcd(p,x) = 1 gcd(x,y) ≠ 1

$x = q \cdot v_1$ $y = q \cdot v_2$

$p \nmid q \cdot v_1$

$p \nmid q$ $p \nmid v_1$

2·3 → 2·5 → $\cancel{2}$ → 5

$p \cdot q_1 \to p \cdot q_2 \to$