Contest Duration: 2025-07-12(Sat) 08:00 (http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250712T2100&p1=248) - 2025-07-12(Sat) 09:40 (http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250712T2240&p1=248) (local time) (100 minutes)

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E - Count A%B=C (/contests/abc414/tasks/abc414_e) Editorial by

spheniscine (/users/spheniscine)

Note that for the tuples (a, b, c) we wish to count, if $a < b, a = c$, therefore we can rule out those. This leaves $\binom{N}{2} = N(N-1)/2$ possible tuples where $a > b$, with the only exceptions being where $c = 0$, therefore we must filter out the tuples where b divides a.

If we fix b, there are $\lfloor N/b \rfloor - 1$ tuples where b divides a to subtract. To do this efficiently, we want to enumerate through triples (l, r, q) such that:

- For all integers $l \leq b < r$ [note the half-open range], $q = \lfloor N/b \rfloor$
- All q are distinct, and segments $[l, r)$ would cover the range $[1, N]$ without overlapping.

We claim that there are at most $O(\sqrt{N})$ such triples. Proof: there are at most $\sqrt{N}$ possible triples where $q \leq \sqrt{N}$. If $q > \sqrt{N}, l < \sqrt{N}$, therefore there are again at most $\sqrt{N}$ triples.

We can enumerate through these triples via the following algorithm:

- Start with $l := 1$.
- While $l \leq n$:
  - $q := \lfloor N/l \rfloor$
  - $r := \lfloor N/q \rfloor + 1$
  - yield (l, r, q)
  - reassign $l := r$

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This is a variant of a common technique of enumerating floored quotients of N in $O(\sqrt{N})$ time (link to yosupo.jp library checker (https://judge.yosupo.jp/problem/enumerate_quotients))

For each (l, r, q) triple, we can thus subtract $(r - l)(q - 1)$ from the answer.

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last update: a day ago

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