Kick Start 2019 - Round G

Analysis: Book Reading

Test set 1

We can solve this test set by naively computing the number of pages that each lazy readers will read. We can do this by initially having an array `torn` of **N** booleans, where `torn[x]` is true if and only if page x is torn out, and then for each lazy reader i, we can iterate from 1 to **N**, incrementing our answer only if the value that we iterate is a multiple of $\mathbf{R_i}$ and not torn out.

The running time of this solution is O(**N** × **Q**).

Test set 2

Let f(x) be the number of pages that are multiples of x and not torn out. To compute f(x), we can only check whether the pages x, 2x, 3x, ..., floor(**N**/x)x are torn out. Therefore, we can do this in **N**/x time.

This means that we can compute f(1), f(2), ..., f(**N**) in a total of **N**(1/1 + 1/2 + ... + 1/**N**) time. 1/1 + 1/2 + ... + 1/**N** is approximately O(log **N**) (since the n-th harmonic number is approximately O(log **N**)), so in total f(1), f(2), ..., f(**N**) can be computed in a total of O(**N** log **N**) time.

After precomputing f(x), we can easily count the number of pages that each lazy readers will read in O(1). The running time of this solution is O(**N** log **N** + **Q**).