ECE30018 Problem Solving Studio, Fall 2023

P8. Bulldozers

| Submission due: 1:00 PM, 14 Nov Tue

Bulldozers

A company made contracts for m construction tasks with different clients and scheduled them in the next n days from tomorrow (i.e., tomorrow is the first day). Every construction task takes exactly one full-day with one Bulldozer. The contract for each task t_i specifies the early due date s_i , that is, the s_i-th day from tomorrow and states that the task should be done within d days from s_i . To complete all m tasks in the n days, the company rents k Bulldozers for the n days. With k Bulldozers, a maximum of k tasks can be done simultaneously in a day as each Bulldozer should be exclusively assigned to a task for a full day. You may assume that s_i + d ≤ n

Write a program to find a minimum number of Bulldozers, k to accomplish a given list of m construction tasks in n days for given d.

Requirements

Input data

- The input data is given from the standard input.
- The first line contains three integers n, d, and m for $1 \leq n \leq 100{,}000$ and $1 \leq d < n$ and $1 \leq m \leq 100{,}000$.
- The second line contains m integers such that the i-th integer represents s_i of task t_i

Output data

- Print an integer to the standard output. The integer represents the minimum number of Bulldozers to be rented in order to complete the m tasks in time.
- Your program should return the answer within 0.5 second

Example of test data

Input data

```
8 2 12
1 2 4 2 1 3 5 6 2 3 6 4
```

Output data

```
2
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