

# Problem 5: Let's Get this Bread

## 4+2+2+1=9 Points

Problem ID: `bread`

Rank: 2+2+3+3

**Speedrun Bounty: The first 2 (different) teams to solve either the bonus A or bonus B test sets will win a [\\$5 Panera Bread Gift Card](#) (or other bakery gift card of your choice)!**

## Introduction

I love bread. I love the plush feeling of dough as it's kneaded around and around, the buttery aroma that envelops me moments before I take a bite, the sensation of gluten strands shredding across the front of my teeth, the feeling of bliss decomposing within me as enzymes pounce and tear at the mush that remains, the adrenaline rush as I reach for another loaf I did not pay for, the sense of anticipation that heightens as I lean in for my next bite—I love bread.

## Problem Statement

There are  $N$  days remaining in the semester. Each day, there are  $B_1, B_2, \dots, B_N$  loaves of bread at the cafeteria. Find the maximum loaves of bread you can eat before the semester ends.

You can access bread at the cafeteria by using up to  $K$  meal cards you've "found on campus," each of which can only be swiped once. When you swipe a meal card at the cafeteria, it activates for the next  $D$  days, including the day that you swipe. You can't swipe any other meal cards during this period (sorry we don't make the rules). If you swipe with less than  $D$  days left in semester, your card will be activated until the semester ends.

Each day you have access to the cafeteria, you'll eat all the available bread. However, if you try to eat on days where  $B_i = 0$ , you'll become indignant at the lack of bread supply and **forfeit the remaining activation period** out of protest—refusing any bread you could've eaten.

Unfortunately, your tragic combination of long-term planning and short-term memory means that you'll come to the cafeteria whenever you have an active meal card, **even if you know there'll be no bread available**.

*Note: For the main test set and bonus test set A,  $K = 1$  (you have only 1 meal card to swipe).*

## Input Format

The first line of the input contains an integer  $T$  denoting the number of test cases that follow.

For each test case:

- The first line contains three space-separated integers  $N$   $K$   $D$ , where:
  - $N$  denotes the number of days in the semester.
  - $K$  denotes the number of meal cards you have.
  - $D$  denotes the number of days a meal card will be activated for after swiping.
- The next line contains  $N$  space-separated integers  $B_1, B_2, \dots, B_N$  denoting the number of bread loaves available at the cafeteria on each day.

## Output Format

For each test case, output a single line containing the maximum loaves of bread you can obtain throughout the semester.

## Constraints

*Note: The test sets for this problem **are not necessarily cumulative**—that is, a solution that passes a test set may not necessarily solve all test sets before it! We encourage you to submit your solution to any test set you believe you can pass.*

$$1 \leq T \leq 100$$

$$0 \leq B_i \leq 10^4$$

### Main Test Set

$$K = 1$$

$$1 \leq N, D \leq 50$$

### Bonus Test Set A

$$K = 1$$

$$1 \leq N, D \leq 10^5$$

The sum of  $N$  across all test cases in a test file does not exceed  $10^5$ .

### Bonus Test Set B

$$1 \leq N, K, D \leq 50$$

### Bonus Test Set C

$$1 \leq N, K, D \leq 10^5$$

The sum of  $NK$  across all test cases in a test file does not exceed  $10^5$ .

# Sample Test Cases

## Main + Bonus A Sample Input

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```
4
4 1 1
1 0 3 2
10 1 3
3 5 0 9 0 2 3 3 2 3
15 1 25
88 82 0 46 15 66 75 49 83 51 21 70 54 69 45
12 1 4
3 1 4 1 5 9 2 6 5 3 5 8
```

## Main + Bonus A Sample Output

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```
3
9
644
22
```

## Main + Bonus A Sample Explanations

### Test Case #1:

Since you have one card that activates for  $D = 1$  days when swiped, swiping your meal card on the third day will allow you to eat 3 loaves of bread, the highest possible amount.

### Test Case #2:

With one available card that activates for  $D = 3$  days when swiped, swiping on the fourth day will allow you to eat 9 loaves of bread, the highest possible amount. Note that despite refusing the 2 loaves on the sixth day out of protest (since  $B_5 = 0$ ), this is still the highest amount you can eat.

### Test Case #3:

Even though  $D = 25$ , there are only  $N = 15$  days left in the semester. So, swiping your meal card on the fourth day will allow you to eat 644 loaves of bread during the remaining 12 days of the semester, the highest possible amount. Note that swiping your meal card before the fourth day, such as on the first day, will allow you to only eat at most 170 loaves of bread before you see that  $B_3 = 0$  and refuse bread for the rest of the semester.

### Bonus B + Bonus C Sample Input

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```
3
7 2 3
0 100 0 100 5 6 7
7 3 3
5 8 6 7 0 9 3
9 2 4
0 7 0 3 3 2 3 0 2
```

### Bonus B + Bonus C Sample Output

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```
118
33
13
```

### Bonus B + Bonus C Sample Explanations

Test Case #1:

With  $K = 2$  cards, you can achieve the optimal amount of 118 loaves of bread two ways:

1. Swiping a card on the second day allows you to eat 100 loaves of bread, before seeing that  $B_3 = 0$  and refusing bread for the remaining two days. Swiping a card on the fifth day allows you to eat 18 more loaves of bread, for 118 loaves total.
2. Swiping a card on the fourth day allows you to eat 111 loaves of bread. Swiping on the seventh day allows you to eat 7 more loaves of bread, for 118 loaves total.

Test Case #2:

Using 2 of your  $K = 3$  available cards on the second and sixth day allows you to eat 21 and 12 loaves of bread, respectively, for a total of 33 loaves—the highest possible amount.

Test Case #3:

Swiping on the fourth and ninth day allows you to eat 11 and 2 loaves of bread, respectively, for a total of 13 loaves—the highest possible amount.