Problem 52: Compounding the Problem

Difficulty: Medium

Originally Published: Code Quest 2017

Problem Background

Personal debt is a huge political issue that affects many people, partly because they don't understand how credit cards work. Fortunately for you, a large credit card company has hired your team to develop an algorithm to compute the monthly interest charged to their customers for balances owed on their credit cards.

Problem Description

The credit card company computes the interest owed by its customers using the following formula:

$$\left(\frac{A}{D}\right) \times \left(\frac{I}{P}\right)$$

Where:
A = the sum of the daily balances in the billing period
D = number of days in the billing period
I = annual interest rate
P = number of billing periods per year

Below is an example credit card statement for a card that charges an 18% annual rate of interest:

Interest Compounds Monthly

Day of Billing Cycle	Beginning Balance	Charges	Payments	Ending Balance
1	$0.00	$200.00		$200.00
2	$200.00			$200.00
3	$200.00			$200.00
4	$200.00	$350.00		$550.00
5	$550.00			$550.00
6	$550.00			$550.00
7	$550.00			$550.00
8	$550.00	$100.00		$650.00
9	$650.00		-$50.00	$600.00
10	$600.00			$600.00
11	$600.00			$600.00
12	$600.00	$400.00		$1,000.00
13	$1,000.00			$1,000.00
14	$1,000.00			$1,000.00
15	$1,000.00			$1,000.00
16	$1,000.00			$1,000.00
17	$1,000.00			$1,000.00
18	$1,000.00			$1,000.00
19	$1,000.00			$1,000.00
20	$1,000.00			$1,000.00
21	$1,000.00	$75.00		$1,075.00
22	$1,075.00			$1,075.00
23	$1,075.00			$1,075.00
24	$1,075.00		-$100.00	$975.00
25	$975.00			$975.00
26	$975.00			$975.00
27	$975.00	$200.00		$1,175.00
28	$1,175.00			$1,175.00
29	$1,175.00			$1,175.00
30	$1,175.00			$1,175.00
			Sum of Daily Balances	$25,100.00

The monthly interest charges for the period are:

($25,100 / 30) x (0.18 / 12) = $12.55

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include:

- A line containing a positive integer, N, representing the number of days in the billing cycle.
- N lines, each containing a comma delimited list of information about each day in the billing cycle in the following format: `<Day Number>,<Purchases>,<Payments>`.

Note that purchases increase the daily balance, and payments decrease it.

```
2
30
1,200.00,
2,,
3,,
4,350.00,
5,,
6,,
7,,
```

```
8,100.00,
9,,50.00
10,,
11,,
12,400.00,
13,,
14,,
15,,
16,,
17,,
18,,
19,,
20,,
21,75.00,
22,,
23,,
24,,100.00
25,,
26,,
27,200.00,
28,,
29,,
30,,
31
1,300.00,
2,,
3,,
4,450.00,
5,,
6,,
7,,
8,100.00,
9,,50.00
10,,
11,,
12,800.00,
13,,
14,,
15,,
16,,
17,,
18,,
19,,
```

```
20,,
21,75.00,
22,,
23,,
24,,100.00
25,,
26,,
27,200.00,
28,,
29,,
30,,
31,,
```

Sample Output

For each test case provided in the program input, your program should print the amount of monthly interest that will be charged to the customer using an 18% annual rate of interest. The beginning balance at the start of each month is always 0. Make sure you print two digits for your cents.

```
$12.55
$19.44
```