CS3201
Algorithm Design

Project Report
Problem: 1582 Bookmakers

Submitted to

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Submitted by

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Introduction

Number of Problem: 1582

Name of Problem: Bookmakers

Difficulty: 117

Problem Author: Sergey Pupyrev (prepared by Vladimir Yakovlev)

Problem Source: ACM ICPC 2007–2008. NEERC. Eastern Subregion. Yekaterinburg, October 27, 2007

Problem Conditions:

- **Time limit: 1.0 second**
- **Memory limit: 64 MB**

Descriptions:

Programmer Sergey visited the homeland of football this summer. On his first day in England, he discovered that there were more bookmakers near the Wembley Stadium than football fans. The bookmakers were taking bets at a wide range of payout odds. As a programmer, Sergey found it easier to operate with betting coefficients instead of odds, and he easily converted odds into these coefficients: if the odds for some outcome of a match are $m: n$, then the betting coefficient k is $(m + n) / n$. This means that if Sergey placed a bet of x pounds and guessed the outcome correctly, he is paid $k \cdot x$ pounds by the bookmaker (and gets nothing if he was wrong).

Having walked around the stadium, Sergey found out that the best coefficients for the

three possible outcomes were 3.5, 3.5, and 3.5 (of course, they were offered by different bookmakers). Sergey placed a bet of 330 pounds on each outcome and was not a bit upset about losing two of the three bets because the third bet brought him 1155 pounds, which was more than he had paid to the three bookmakers altogether. In order to cover his travel expenses, Sergey decided to place bets every day distributing them in such a way that he would win as much as possible in the worst case. Write a program that will help Sergey to place bets optimally.

You are given the best coefficients $k1$, $k2$, and $k3$ for the three possible outcomes of a match. Find the maximal sum of money that Sergey will receive in the worst case if the total amount of the bets he places is 1000 pounds.

Input & Output

Input: The single line of the input contains the numbers $k1$, $k2$, and $k3$ separated by a space. The numbers are in the range from 0.01 to 100.

Output: In the single line of the output, give the maximal amount of money that Sergey gets back in the worst case. You may assume that bets and payouts can be fractional numbers. Round the answer to an integer according to the standard mathematical rule.

Samples

input	output
3.5 3.5 3.5	1167
1.25 10.0 5.75	931

2. Code Overview

a. Solution

```cpp
#include <cstdio>
#include <cmath>
using namespace std;
int main(){
    double k1,k2,k3;
    scanf("%lf %lf %lf",&k1,&k2,&k3);
    printf("%.0f\n",1000*k1*k2*k3/(k1*k2 + k2*k3 + k3*k1));

    return 0;
}
```

b. Implementation Steps

Line 1: Declare for using the file that we need

Line 2: Declare the function that we need

Line 3: Declare for allowing to access all the namespace library function

Line 4: the function that will return value as an int

Line 5: Declare the variable as a Double to handle the floating number

Line 6: Get input from the user

Line 7: Print the formula the calculate the maximum sum of money that Sergey will receive in the worst case

Line 8: otherwise become a zero

formula:

Sergey places the bets 1,000 pounds for three possible outcomes.

= 1,000 * k1 * k2 *k3 is the maximum money that Sergey will receive

deducted by (k1 * k2 + k2*k3 + k1*k3) the sum of the worst case.

c. output

```
3.5 3.5 3.5
1167
```

```
1.25 10.0 5.75
931
```

```
24 99 1
951
```

```
0.0 4 25.9
0
```

3. Submission
a. submission result from Timus

Solutions judgement results

ID	Date	Author	Problem	Language	Judgement result	Test #	Execution time	Memory used
8367239	01:19:30 9 May 2019	Chinnawat	1582	Visual C++ 2017	Accepted		0.001	196 KB
8367238	01:18:01 9 May 2019	Sergey Nikolaev	1419	Visual C# 2017	Runtime error	11	0.046	2 144 KB
8367237	01:17:13 9 May 2019	Chinnawat	1582	Visual C++ 2017	Accepted		0.015	192 KB
8367236	01:16:06 9 May 2019	Chinnawat	1582	Python 3.6	Wrong answer	5	0.078	356 KB
8367235	01:13:25 9 May 2019	Emir	1639	G++ 7.1	Accepted		0.001	416 KB
8367234	01:12:53 9 May 2019	damir	1207	G++ 7.1	Accepted		0.046	1 256 KB

b. submission detail

Language: Visual C++ 2017

Execution time: 0.015

Memory used: 192 - 196 KB

Reference

solution by marioyc: https://github.com/marioyc/Online-Judge-Solutions/blob/master/Timus%20Online%20Judge/1582%20-%20Bookmakers.cpp