

## Problem J - Declining stock prices

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CSC1016S - 2015 - problem set

Input: Standard Input; Output: Standard Output; Time Limit: 5 Seconds

Fatima Cynara is a data analyst at Consolidated Stocks Ltd (CS). CS has had some very good times as well as some bad ones, in particular around the dot-com bubble and the global recession in 2008. Fatima does trending analysis of the stock prices for CS, and she wants to determine the largest decline in stock prices over various time spans. For example, if over a span of time the stock prices were 19, 12, 13, 11, 20, and 14, then the largest decline would be 8 between the first and fourth price. If the last price had been 10 instead of 14, then the largest decline would have been 10 between the last two prices.

Fatima has done some previous analyses and has found that the stock price over any period of time can be modelled reasonably accurately with the following equation:

$$\text{price}(k) = p \cdot (\sin(a \cdot k + b) + \cos(c \cdot k + d) + 2) \quad (1)$$

where  $p$ ,  $a$ ,  $b$ ,  $c$ , and  $d$  are constants. As Fatima has degree in financial mathematics, not computing, she would like you to write a program to determine the largest price decline over a given sequence of prices. Figure A.1 illustrates the price function for Sample Input 1. You have to consider the prices only for integer values of  $k$ .

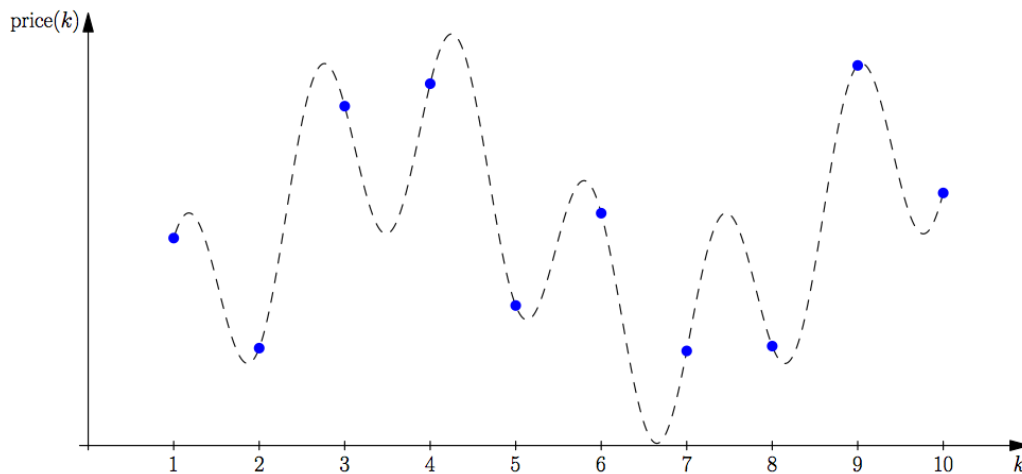


Figure 1: Sample Input 1. The largest decline occurs from the fourth to the seventh price.

**Input** The input consists of a single line containing 6 integers  $p$  ( $1 \leq p \leq 1000$ ),  $a$ ,  $b$ ,  $c$ ,  $d$  ( $0 \leq a, b, c, d \leq 1000$ ) and  $n$  ( $1 \leq n \leq 10^6$ ). The first 5 integers are described above. The sequence of stock prices to consider is  $\text{price}(1)$ ,  $\text{price}(2)$ , ...,  $\text{price}(n)$ .

**Output** Display the maximum decline in the stock prices. If there is no decline, display the number 0. Your output should be rounded off to 6 decimal digits.

**Sample input**

```
42 1 23 4 8 10
100 7 615 998 801 3
100 432 406 867 60 1000
```

**Sample output**

```
104.855110
0.000000
399.303813
```