Coding Area

Systematic Equity Plan

Problem Description

Equity is an asset class which has proven to give a good return over a long period of time. Warren is convinced that it is a good vehicle for investment. He has done some studies and figured out which stock he wants to invest in.

His investment will follow the following rules:

- On every 1st of the month for the next 10 years, he will choose to invest 'X' amount to buy his favorite stock
- He will not sell even a single share until 10 years are over. However, he will sell it on the first day of the first month of the 11th year
- He will buy or sell without paying much attention to the share price on those milestones
- When it comes to buying, he will adopt the following rules:
  - If the share price exceeds 'X', he will make sure to buy at least one quantity
  - If 'X' is greater than the share price, he will buy integral number of shares since the purchase of fractional quantity of shares is not allowed
  - The quantity of shares that he buys when share price is less than 'X' depends on how close the transaction value is to 'X'. For e.g., if 'X' is 1000 and share price is 600, then the transaction value of buying one share is 600 and two shares is 1200. Since |1000-1200| is less than |1000-600|, in this case he will buy two quantities of the share

Your job is to compute the rate of return that Warren has achieved over his entire investment period of 10 years.

Constraints

Investment period will always be 10 years (120 months)

Assume that it is always possible to purchase on the 1st day of every month irrespective of holidays

100 <= X <= 20000

Input

First line contains an integer 'X' which denotes the approximate amount he would like to invest every month.

Second line contains an array of 120 space separated integers which denote the price of the stock on the first day of every month for 10 years at which Warren has made the investment.

Third line contains an integer which denotes the stock price on the 121st month at which he sells all the shares accumulated for the prior 120 months.

Output

Single integer that denotes the *floor* value of the rate of returns expressed as percentage, that Warren has obtained over his investment period.

Time Limit (secs)

1

Examples

Example 1

Input

1000

132 138 124 124 111 120 118 132 130 130 122 120 120 116 110 120 120 110 110 97 114 110 114 105 100 86 93 90 116 117 114 105 107 114 110 107 110 121 121 126 112 114 114 101 100 108 110 120 120 100 108 114 116 123 132 130 127 127 137 134 148 135 137 137 130 133 132 145 140 151 152 146 143 136 141 142 140 130 130 140 140 130 120 125 115 117 135 135 132 140 130 120 117 119 115 117 112 106 83 90 95 97 90 100 87 88 94 100 90 107 104 103 109 116 117 113 130 138 130 124

137

Output

3

Explanation

First line of input denotes that Warren will spend approximately 1000 units of money to buy the stock. Second line of input denotes the stock prices for the 120 months of his investment period. Third line contains the exit price on the first day of the 121st month. Thus, Warren buys shares at prices corresponding to stock prices in second line of input and sells all his accumulated shares at a price of 137.

The first month stock price is 132. He can buy 8 shares at a transaction value of 1056 or he can buy 7 shares at a transaction value of 924. Since |1000-1056| is lesser than |1000-924|, he will buy 8 shares in the first month.

The second month stock price is 138. He can buy 7 shares at a transaction value of 966 or he can buy 8 shares at a transaction value of 1104. Since |1000-966| is lesser than |1000-1104|, he will buy 7 shares in the second month.

Applying this technique, he will have accumulated 1032 shares by the end of 120 months. Please notice that his first month investment has an investment period of 120 months, his second month investment has an investment period of 119 months and so on. These 1032 shares are sold at the price of 137 on the first day of the 121st month. His profit for the first month will be 40, second month will be -7, so on and so forth, for all 120 months. This ends up as 3.162% rate of return over his investment period. The floor of 3.162 is 3. Hence, the output is 3.

Example 2

Input

10000

4236 4450 4550 4700 4500 4500 4500 4700 4400 4600 4600 5000 4600 4800 4600 4700 5200 4900 5500 4600 5100 5600 5200 5300 5000 4900 5000 4700 4800 4900 5200 6000 6200 6000 6200 6200 7300 7000 6800 6800 7000 6000 6200 6100 6200 6300 6000 5800 5500 5100 5400 6000 6200 6500 7300 6800 6500 7000 6300 6000 6000 6300 6500 6700 6700 6700 6800 7000 7200 7200 7500 7700 7500 7800 8200 9000 9700 9800 10300 11300 9700 9600 10700 11300 11400 10700 11000 11000 11000 12000 11600 12500 13700 14800 14600 14600 15500 15700 15100 17600 17000 16600 17100 16100 15700 17100 17900 18600 17400 16100 16600 16600 17500 17500 18000 20000 19500 19000 19300 19400

17800

Output

16

Explanation

First line of input denotes that Warren will spend approximately 10000 units of money to buy the stock. Second line of input denotes the stock prices for the 120 months of his investment period. Third line contains the exit price on the first day of the 121st month. Thus, Warren buys shares at prices corresponding to stock prices in second line of input and sells all his accumulated shares at a price of 17800.

For the first 36 months he will be able to buy 2 shares per month. In the 37th month, the stock price is 7300 which will permit him to buy only one stock. Similar calculations will be followed until the 120th month.

There are a few months where stock price is greater than 10000 which will permit him to buy only one share.

He will have accumulated 175 shares by the end of 120 months. These 175 shares are sold at the price of 17800 on the first day of the 121st month

He will have accumulated 175 shares by the end of 120 months. These 175 shares are sold at the price of 17800 on the first day of the 121st month.

His profit for the first month will be 27128, second month will be 26700, so on and so forth, for all 120 months. This ends up as 16.880% rate of return over his investment period. The floor of 16.880 is 16. Hence, the output is 16.

Upload Solution [Question : F]

☐ I, **Venkat** confirm that the answer submitted is my own.

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