

Problem 1: Hello World!

Instructions

This is the classic first program made famous in the early 70s.

Write the body of the program called `Problem1` that prints out `Hello World!`

The text must be terminated by a new-line character.

Details

Input

None.

Processing

The program prints out the required text, followed by a new-line, and exits.

Output

The required text: `Hello World!`

Examples

Sample Input	Sample Output
N/A	<code>Hello World!</code>

Problem 2: Grade histogram

Background

For this problem, you will create a histogram based on a set of (integer) values obtained through standard input. You will first be given an integer that represents the size of the data set that you are to expect. Following this, you can expect a data set of exactly that size (no more or less).

A **histogram** is a graphical display where the data is grouped into ranges (such as "10 to 19", "20 to 29", etc), and then plotted as bars. It is a simple way to show the frequency of data that falls into a certain range.

For our purposes, we will draw the histogram (only the asterisks) on its side as shown below:

```
10-19: *****
20-29: *********
30-39: ****
40-49: **
50-59: *
```

The above histogram shows that there were 6 values in the range from 10 to 19, 8 values in the range from 20 to 29, 4 values in the range from 30 to 39, 2 values in the forties and one value in the fifties. Each asterisk represents one value in the specified range.

Instructions

Write a program called `Problem2` that creates a histogram based on data obtained through standard input.

You are to first read in a set of integer values that will be used to create the histogram. The first integer will tell you the size of the data set to expect. You can then read in that (exact) quantity of integer grade values.

Once the last integer is read, the program should create/display the histogram.

For this histogram, you are to have five grade ranges that will be used to keep track of integer grade values between 0 and 100.

- The first is the grade F range containing grade values ranging from 0 to 49.
- The second is the grade D range containing grade values ranging from 50 to 59.
- The third is the grade C range containing grade values ranging from 60 to 69.
- The fourth is the grade B range containing grade values ranging from 70 to 79.
- The fifth is the grade A range containing grade values of 80 and greater.

Details

Input

A list of non-negative integers.

- The first integer gives the expected length n of the data set.
- The remaining n integers are the data set to be used in all further calculations.

Processing

Each element in the data set will fall into one of the following grade ranges:

Grade	Range
F	0 - 49
D	50 - 59
C	60 - 69
B	70 - 79
A	80 - 100

Your program will calculate how many grades fall into each of these defined categories.

Output

For each of the grade ranges, you will draw the histogram on its side. Each grade within a given grade range will be represented by one asterisk.

Example

Sample Input	Sample Output
11 41 51 52 53 61 71 72 73 74 81 91	F: * D: *** C: * B: **** A: **
9 41 51 52 61 62 63 71 72 81	F: * D: ** C: *** B: ** A: *
12 21 31 41 51 52 61 62 63 71 81 91 100	F: *** D: ** C: *** B: * A: ***

Problem 3: Grade averages

Background

For this problem, you will calculate the mean and median from a set of (integer) values obtained through standard input.

The mean is calculated by dividing the sum of the values in the set by the number of elements in the set.

$$\text{mean of a set} = \frac{\text{sum of all elements}}{\text{number of elements}}$$

The **median** of a set of numbers is the quantity lying at the midpoint of their frequency distribution, such that half the values are less and half are greater than the median.

Calculating the median The median denotes the middle term of a series arranged in order of magnitude or, if there is no middle term, the average of the middle two terms.

E.g. The median number of the series **55, 64, 76, 82, 97** is **76**.

For example, the series

1 2 **3** 4 5

has 3 as its median. However, the following

1 2 **3 4** 5 6

has 3.5 as its median.

Instructions

Write a program called `Problem3` that calculates both the mean and median value of a set of data obtained through standard input.

You are to first read in a set of integer values that will be used to calculate the mean and median. The first integer will tell you the size of the data set to expect. You can then read in that (exact) quantity of integer grade values.

Once the last integer is read, the program should calculate and print the calculated mean and median grade values to the screen.

Details

Input

A list of non-negative integers.

- The first integer gives the expected length n of the data set.
- The remaining n integers are the data set, sorted by increasing value, to be used in all further calculations.

Processing

Calculate the median grade from the data set received.

Output

Output the mean and median values (each to 1 decimal place), labeled as shown below.

Example

Sample Input	Sample Output
4 40 40 40 100	Mean: 55.0 Median: 40.0
4 40 41 42 47	Mean: 42.5 Median: 41.5
5 40 50 60 70 80	Mean: 60.0 Median: 60.0
6 40 50 60 70 78 80	Mean: 63.0 Median: 65.0

Bonus/Challenge Problem: Unsorted data

Background

This problem is the same as Problem #3 with one exception: The data that you receive is unsorted.

For this problem, you will calculate the mean and median from a set of (integer) values obtained through standard input.

Instructions

Write a program called `ChallengeProblem` that calculates both the mean and median value of a set of data obtained through standard input.

You are to first read in a set of integer values that will be used to calculate the mean and median. The first integer will tell you the size of the data set to expect. You can then read in that (exact) quantity of integer grade values.

Once the last integer is read, the program should calculate and print the calculated mean and median grade values to the screen.

Details

Input

A list of non-negative integers.

- The first integer gives the expected length n of the data set.
- The remaining n integers are the **UNSORTED data set** to be used in all further calculations.

Processing

Calculate the median grade from the data set received.

Output

Output the mean and median values (each to 1 decimal place), labeled as shown below.

Example

Sample Input	Sample Output
4 40 40 100 40	Mean: 55.0 Median: 40.0
4 41 42 47 40	Mean: 42.5 Median: 41.5
5 40 50 60 70 80	Mean: 60.0 Median: 60.0
6 40 50 60 70 78 80	Mean: 63.0 Median: 65.0