Sample Questions for the on-Campus Programming Competition

Question 1:
A Leap Year is a year containing one additional day. It occurs once every four years, it has 366 days including 29 February.
To check that a given year is a leap year or not, follow the following rules:

- The year value is a positive integer.
- If year is dividable by 400 or,
  the year is dividable by 4 but not by 100.

Write a program to ask the user for a year and then print out whether or not it is leap year.
For example: 2012, 2004, 1968 are leap years but, 1971, 2006 are not leap years. Similarly, 1200, 1600, 2000, 2400 are leap years but, 1700, 1800, 1900 are not.

Question 2:
The factorial of any positive integer number n ($n!$) is defined by the following product:

$$n! = \prod_{k=1}^{n} k \quad and \; 0! = 1$$

Write a program that asks the user for a positive integer, calculates its factorial and prints it out.

Question 3:
You are asked to write a program that computes the standard deviation of numbers entered by the user. Start by declaring an array with a maximum length of 100. Ask the user for the number of values to be entered, read the values and then compute and print out the standard deviation.
Hints:
1. The number of values entered by the user must be a number between 2 and 100.
2. The Standard deviation for a vector **x** of n elements is given by:

$$std(\mathbf{x}) = \sqrt{\frac{((x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + (x_3 - \bar{x})^2 + (x_4 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2)}{n - 1}}$$

Where $\bar{x}$ is the average of the vector **x**, i.e. the values entered by the user.