National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	**Programming Fundamentals**	**Course Code:**	**CS 118**
	Program:	**BS(SE)**	**Semester:**	**Fall 2020**
	Duration:	**Before Midnight Today**	**Total Points:**	**30**
	Paper Date:	**Saturday, 21 November 2020**	**Weight**	**3%**
	Section:	**BSE-1A and BSE-1B**	**Page(s):**	

Student : Name:_____ Roll No._____ Section:_____

Instruction/Notes: Taking some illegal online/offline help (i.e. cheating) might earn you an **F** grade in the entire course.

This Exam has **three** regular questions and a bonus question. Your Bonus question will be evaluated only if you have completed the three regular questions.

Problem 1. UNIMODEL ARRAY

An array of numbers is called **UNIMODAL** if and only if it can be split into an increasing sequence followed by a decreasing sequence. Following are examples of UNIMODEL arrays

1	2	3	4	8	**10**	9	6	5	0

1	2	4	8	16	32	64	128	256	**512**

10	**20**	18	16	15	14	9	5

30	20	18	16	15	14	9	5

The Largest value of the UNIMODEL array

whereas following arrays are **NOT UNIMODEL**

1	2	3	4	8	10	9	12	5	0

1	2	4	8	16	32	64	128	100	256

In this problem you are required to write a C++ program that

a. declares a one dimensional array of size **ARRAYSIZE** where ARRAYSIZE is defined using the **#define** directive **[1 Point]**

b. fills the entire array using numbers input from the user **[1 Points]**

c. decides if the array is UNIMODEL **[5 Points]**

d. if the array is UNIMODEL then show a message that **ARRAY IS UNIMODEL** and the values of array on console, **one number on one line**, with the **mode** of the array **highlighted using *** else show a message that the **ARRAY IS NOT UNIMODEL** and the values of array on console **[3 Points]**

Sample Inputs/Outputs

Inputs	Outputs
1 2 3 4 8 10 9 6 5 0	ARRAY IS UNIMODEL 1 2 3 4 8 10* 9 6 5 0
1 2 4 8 16 32 64 128 100 256	ARRAY IS NOT UNIMODEL 1 2 4 8 16 32 64 128 100 256

Problem 2. PALINDROME NUMBERS

Remember that palindrome is a word, or sequence that reads the same backwards as forwards, e.g. madam, civic. The number 585 is an interesting number since it is also a palindrome number in Base-10.

In this problem your task is to write a C++ program that check as if numbers in a given set of number are palindromes.[10 Points]

Input

Input to your program will consists of multiple test cases (**numbers**), each with the given number in base 10. The first input will be n, the number of test cases followed by n cases/numbers.

Output

For each input number your program must either output a **YES** if the number is palindrome or an **NO** if the number is not a palindrome

Sample Input	Sample Output
5	
585	YES
252252	YES
544	NO
441	NO
8	YES

Hints:

- When You Divide the integer 252252 with 10^5 you get the last digit
- When You take the remainder of 252252 when divided by 10 you get the first digit
- If you subtract $2*10^5$ from 252252 you get 52252
- If you divide the number 52252 by 10 you get 5225

Problem 3. FIBONACCI SEQUENCE

The Fibonacci sequence is defined as the sequence of numbers in which each of the number is sum of the preceding two numbers. For example if the first two numbers are 0 and 1 then the Fibonacci sequence would be

0 1 1 2 3 5 8 13 21 34...

In this problem your task is to write a C++ program that take as input a **LIMIT** and display

a) all terms of the above Fibonacci sequence that are less than a given **LIMIT [4 Points]**

b) **average** of the terms of shown in **part a [3 Points]**

c) number of terms of Fibonacci sequence that are less than **average** computed in part b **[3 Points]**

Sample Inputs/Outputs

Input	Output
5	Sequence 0 1 1 2 3 Average: 1.4 Term Count Less Than Average: 3
10	Sequence 0 1 1 2 3 5 8 13 21 34 Average: 8.8 Term Count Less Than Average: 7