American University of Armenia
CS 120 Intro to OOP
Spring 2019

Homework Assignment 7, Part 1

1. **(7 points)** Write a C++ program to read a natural number n, find and print the sum of all odd integers between 1 and n using a `for` statement. If you use variables of type `unsigned int`, what is the largest value of n for which your program works correctly? And what is the largest value of n if you rely on variables of type `int`? Explain your answers.

2. **(7 points)** Write a C++ program that calculates the value of π from the infinite series

$$\pi = 4 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \cdots$$

   Print a table that shows the approximate value of π after each of the first 1000 terms of this series.

3. **(10 points)** Write two variants (iterative and recursive) of a C++ program that reads an odd number n ($1 \leq n \leq 19$) and prints a diamond of asterisks of n rows. For example, if $n = 9$, the printed diamond should look like

```
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *
```

4. **(10 points)** Write a complete C++ program with the two alternate functions specified below, each of which simply triples the variable `count` defined in `main`. Then compare and contrast the two approaches. These two functions are

   (a) function `tripleByValue` that passes a copy of `count` by value, triples the copy and returns the new value and

   (b) function `tripleByReference` that passes `count` by reference via a reference parameter and triples the original value of `count` through its alias (i.e. the reference parameter).

5. **(16 points)** Write a C++ program that transforms the daily temperatures for a few weeks from Celsius to Farenheit and prints the weekly averages. The input of your program should be the number of weeks and the daily temperatures in Celsius for those weeks. On each line of the output, your program should print the daily temperatures in Farenheit for the corresponding week followed by their average.

The program should contain three functions: one for converting a single temperature from Celsius to Farenheit; one for converting the daily temperatures of a whole week; and one for calculating the weekly average of temperatures. These functions may rely on each other.

For example, on the input

```
2
-2 -3 -4 0 1 -2.4 -4
1 3 4 5.3 0 -1 1
```

your program should output

```
28.4 26.6 24.8 32 33.8 27.68 24.8  average:  28.297
33.8 37.4 39.2 41.54 32 30.2 33.8  average:  35.42
```