CS 11 Exercise 2
1st Semester, AY2018-2019

August 27, 2018

1 Instructions

- For this exercise, you have to write five different computer programs. A submission link is available in UVLe for each program.
- Make sure that your algorithm works given the sample input and output. You must also check if your algorithm can also handle input other than the ones given.
- Submit your solutions on or before Sunday, September 2 at 11:59pm.
- Please remove any prompt messages (e.g. `Enter number:`) when getting input. Prompt messages will mess with your output, making your solution invalid.
- See the sample input and output to guide you on what and how your program must display output.

2 Problems

1. (2 points) Write a program that takes a temperature reading in Fahrenheit and outputs the equivalent measurement in Celsius. Round your output to two significant digits.

   Hint: Python 3 has a built-in function `round` that takes two numbers: the number to be rounded, and the number of decimal places to include. Use this function for rounding results.

2. (2 points) Write a program that computes the difference between the square of the sum of numbers 1 to N and the sum of squares of the numbers 1 to N. Your program must take an integer N for input and it must print an integer for output. If the $N \leq 0$, output `Invalid!!!`.

   Hint #1: $\sum_{i=1}^{N} i =?$

   Hint #2: $\sum_{i=1}^{N} i^2 =?$

   Hint #3: You might need to use a conditional statement for this problem (and the next problems).

3. (2 points) A sphere with radius r is inscribed perfectly tightly into a cube. Write a program that computes the volume of the region inside the cube that surrounds the sphere. Round your output to four significant digits. If $r \leq 0$, output `Invalid!!!`

   Hint: Use the `math.pi` constant from Python's `math` package instead of defining your own π.

4. (2 points) Write a program that prints two character strings N times in an alternating fashion. Your program must take two strings and an integer N for input. Combine the strings and print them N times. If N is 0, print nothing. If $N < 0$ print `Invalid!!!`

5. (2 points) Write a program that computes the real roots of the quadratic equation $Ax^2 + Bx + C = 0$. Your program's input must be the real numbers A, B, and C, respectively. Print the roots of the solution, starting with the smaller root. If the roots are equal, print both. Round your answers to two decimal places. If there are no real roots, print `No real solution.` Round your answers to two decimal digits.

   Hint: The `math` package in Python 3 has a function called `math.sqrt` for computing the square root of a number. Use that function instead of making your own approximation.