

**CS 1213-01 Program #7**  
Fall 2018

**Due:** November 14

**Background**

You can approximate the value of the trigonometric function  $\sin(x)$ , where  $x$  is given in radians, with this formula:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \frac{x^{11}}{11!} + \dots$$

Recall that  $n!$  is the factorial of  $n$ , that is,  $1 \cdot 2 \cdot 3 \cdot \dots \cdot (n-1) \cdot n$ .

**Assignment**

Write a Python program that uses this formula to compute an approximation of  $\sin(x)$ . Prompt the user to enter the name of an input file and an output file. The input file will contain a list of floating-point numbers, one number per line. The program should input each number, compute its sine, and write the sine (rounded to five decimal places) to the output file. See the sample files below.

**Implementation Details**

Include in your program a function that computes and returns the value of  $\sin(x)$ . Use the first twenty terms of the formula to do the computation. The example above only lists the first six terms.

The inquisitive student will discover that there is a predefined function available in the standard Python library that will do this computation. You must not use the predefined function in this program. You must write your own function.

Include the usual box comment at the beginning of the program. Also, include a box comment before the function definition in the style illustrated by the sample programs we have studied in class.

**Sample input file:**

```
6.5
-0.5
1.0
-1.0
10.0
```

**Corresponding output file:**

```
0.21512
-0.47943
0.84147
-0.84147
-0.54402
```

## Instructions for Turning in Your Project

I will not grade your project and you will receive a score of 0 if you do not comply with these instructions. You must turn in all materials by class time on the due date for them to be counted on time. Your submission is not complete—and I will not grade it—until you have turned in all the required materials. Anything that is not turned in by class time will be marked at least one day late and will receive a grading penalty as specified in the syllabus.

Turn in these things:

- Upload your Python program to Canvas.
- Turn in a hardcopy of your Python program at class time on the due date. Your hardcopy must match the electronic copy that you upload to Canvas.
- Turn in a printed, completed copy of the project form along with your hardcopy on the due date. There is a blank project form in *Handouts* on Canvas.