Fortran and Python Exercise 2

1. There are many ways to compute the value of pi, including several infinite series. One of the best known is the Leibnitz formula

$$\frac{\pi}{4} = \sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1}$$

Write a program to compute pi until it agrees with the system pi (obtained as you were taught in the first homework) to within 10^{-8} You will need to use the abs() built-in function (available in both Fortran and Python, with the same name and behavior). Print out the system value, the computed value, and the number of terms of the series that was required to obtain this precision.

2. The series

$$\sum_{n=1}^{\infty} \frac{1}{2^n}$$

converges to a number. Write a program that evaluates the first K terms of this sum from K=1 to K=50 in steps of 5. Print out the values of K and the sum.

3. Compute the same sum as in Problem 2, but this time terminate the computation when the new value differs from the previous value by less than 10^{-12}. How many terms did you need? Hint: this time you need only one loop.