Shiv Nadar University <u>CSD101: Introduction to Computing and Programming</u> Lab #5 Loops, functions, 1D arrays - 2

Max marks: 80 Due on/before:17.00, 25-Sep-2021.

1. Write a program that takes any number in the range 0 to 99999999999 (1 less than a trillion) and writes it out in words using the words *hundred*, *thousand*, *million*, *billion* and the standard words for numbers under 100. Here are some examples:

8: eight; 39: thirty nine; 542: Five hundred and forty two; 8769: Eight thousand seven hundred sixty nine; 174345: One hundred seventy four thousand three hundred forty five; 6457892: 6 million four hundred fifty seven thousand eight hundred ninety two; 999999876543: Nine hundred ninety nine billion nine hundred ninety nine million eight seventy six thousand five hundred forty three.

2. Many functions can be written as infinite series. For example,

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

Where n! is factorial of n. Remember x is in radians in the above function and the conversion between degrees and radians can be done by using π radians = 180 degrees. Note that the denominator (and the numerator) can become big quite rapidly so you should be careful when doing the calculation. Write a program to print a table for sin(x) from 0° to 360° in increments of 30°. You should use enough terms in the infinite series so that your value should be within ϵ of the true value where ϵ is read in from the user. Try for at least two different values of ϵ - for example 0.0001 and 0.00001. In addition to the table, print out the largest number of terms from the infinite series that were required while constructing the table.

Interesting challenge (not for credit): see if you can do the entire calculation inside a single loop without using any library functions.

[30]

[50]

18-Sep-2021