

**SCHOOL OF ADVANCED TECHNOLOGY**

ICT - Applications & Programming

Computer Engineering Technology – Computing Science

**Numerical Computing – CST8233**

**Term:** Spring 2023

# Assignment #1: CSV Files and Series

## Objectives

In this assignment, you will be challenged to complete three tasks, involving

* Reading, modifying and saving CSV (Comma-Separated Value) files, and
* Performing calculations involving series.

## Grades:

**6%** of your final course mark

## Deadline

June 23rd, 2023 before 11:59 PM.

## Tasks

### Task 1: CSV Files (12 marks)

CSV files are commonly encountered. They store data in a "plain-text" format, often, *but not always*, using commas to separate values.

You have been given a file named "**assignment1.csv**", which contains a variety of data about cereals. To earn marks, you must write a script that does the following:

* (3 marks) Read the "assignment1.csv" file and
  + Save it as a dataframe named "**CerealsDF**"
  + Display the structure of "**CerealsDF**" using str() function and examine the variables and their classes
  + Display the first ten rows of "**CerealsDF**"
* (3 marks) The second line in "**CerealsDF**" represents the data type of each column.
  + Delete this line from the dataframe
  + Print the number of rows and columns in the data frame
  + Add a new column named “totalcarbo” that shows the total of both carbo and sugars columns
* (3 marks) The “type” column shows the type, i.e., hot or cold, of the cereal and “mfr” column shows the manufacturer of the cereal.
  + Find how many cereals are hot. Use subset() function
  + Find how many unique manufacturers are mentioned in the dataframe. Use unique() function
  + Extract all cereals that are manufactured by Kellogg’s (“K”). Call this dataframe as “cereals\_K” and print it
* (3 marks) To examine the total value of each type, we need to look at the values of two or more columns.
  + Extract all cereals that have less than or equal 90 calories AND have more than 2 units of fat
  + Save this subset as a CSV file on your desk. Use wirte.csv() function

### Task II: Vectors, Functions, Series (12 marks)

You are given the following discrete data that represent the following function:

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* Write an R function that implement the Interpolation formula shown in the class. Call this function MyIntCal().
* What is degree of the interpolating function?
* You should have seven Lagrange polynomials, L1, L2, …, L7. Create a 4x2 figure and plot each of these polynomials in one subfigure. Add the final interpolating function in the last subfigure. Save this figure as MyIntFig.pdf
* Use the built in function poly.calc() to find the interpolating function and call it pf\_x.
* Find the value of using MyIntCal() and pf\_x.
* Find the value of using MyIntCal() and pf\_x.

*“Any fool can write code that a computer can understand. Good programmers write code that humans can understand.” –* ***Martin Fowler***