Programming Assessment Exercise
School of Information Sciences. Rev. 11/2017

Download the two data files from this Moodle "Assignment". They are called "co2_hawaii.txt" and "co2_alaska.txt". These files are from the U.S. National Oceanic and Atmospheric Administration (NOAA). They contain over 40 years of measurements of carbon dioxide levels (CO_2) in the atmosphere, taken from instruments at Barrow, Alaska and Mauna Loa, Hawaii.

Use a text editor to view and familiarize yourself with their contents and format, but make sure you do not modify the input files. **There are detailed comments in the data files explaining the meaning of each column in the data.**

- ☐ Time yourself as you work on this program. When finished, you'll be asked how long you worked on it.
- ☐ You may use any general-purpose programming language of your choice (whatever you're most comfortable using). Do not use Microsoft Excel or another spreadsheet application, nor SQL, SAS or SPSS. Those are not general-purpose languages.
- ☐ Write a program to automatically perform the following data processing steps:

1. Read the unmodified files and load all the data values into some kind of appropriate array, matrix, or similar data structure(s).
2. Parse the Quality Control Flags to know which rows have invalid data that must be ignored in calculations. Typically, you'll see "-999.99" in place of the co2 value, but there may be other kinds of invalid rows, so determine validity from the "qcflag" column only.
3. Calculate the following items PER YEAR, and output a new text file called "annual_co2.txt" containing a table with year down the side and each column heading indicated, for both locations.:
    a. "MAX_LEVEL": The highest CO_2 daily level recorded.
    b. "MEAN_LEVEL": The mean (average) of daily CO_2 levels recorded.
    c. "%CHANGE": Percentage change of "Mean level" compared to previous year.

    Arrange the output data like this, and round the mean CO2 values to 2 decimal places:

```
      ALASKA                                HAWAII
YEAR  MAX_LEVEL   MEAN_LEVEL   %CHANGE   MAX_LEVEL   MEAN_LEVEL   %CHANGE
1973
1974
1975
…
2015
2016
```

4. Then have the program calculate the mean of the annual "%CHANGE" results for each location, and add those results below the table.

- ☐ Once your program is finished, submit your program source code file(s) and the data output file to Moodle.