Problem Statement

You are a software engineer working for a company that manufactures residential HVAC equipment and is researching temperature trends in Columbus, OH. You've been asked to finish a program that a colleague started that processes temperature data. The program contains functions that: (1) convert Celsius readings to Fahrenheit, (2) calculate the average temperature in a data set, and (3) find the max and min temperatures in a dataset. The average and max/min functions will work with either Celsius or Fahrenheit values. You've been supplied with a data file for testing purposes as well as a partially written program. The data file contains the average monthly temperatures in degrees Celsius in Columbus, OH for the period January, 1980 through December, 1989. The data is organized such that the first line is January, 1980, the second line is February 1980, etc. You can open the file to inspect its contents. The two files, **APP_C32_1.cpp** and **APP_C32_1_temperature.dat**, can both be found here:

`/share/EED/class/engr1281/students/c/Class_32/Application`

Instructions

Represent

- Consider creating a flowchart, algorithm, or pseudocode for solving the problem to ensure that you understand the program, particularly the function prototypes, calls, and definitions.

Plan

- Copy the files **APP_C32_1.cpp** and **APP_C32_1_temperature.dat** to your working directory.
- Read through the program, looking closely at the comment statements and the differences and similarities between the function prototypes, function calls, and the first line of the function definition.
- This program is more about understanding what is going on than writing code. It's also kind of a scavenger hunt. Look around enough and you should find the answers to other parts.
- You may want to add **`printf()`** statements and/or comment out entire sections to make your testing and debugging easier.

Implement

- You must use the function prototypes, function calls, and function definitions that are provided.
- You must fill in the appropriate code wherever you find **`*** CODE ***`**.
- Complete the C/C++ program **APP_C32_1.cpp** to perform the following tasks:
  - Open an existing data file, **APP_C32_1_temperature.dat**, verifying the file opened successfully.
  - Read all data from the file into an array.
  - Complete the function calls and definitions to:
    - Convert Celsius to Fahrenheit
    - Find the average temperature
    - Find the max and min temperatures
  - Print these values to the screen.
  - Close **APP_C32_1_temperature.dat.**
- Compile, link, and run your program.

Evaluate

- Verify your results using Excel.

Document

- Create a single PDF that includes your program, output from running the program, and verification.
- Submit the PDF to Carmen according to the DAL.

Include the standard comment, **`printf(),`** and **`fprintf()`** statements indicating name, etc.