Fortran and Python HW3

The Christmas Bird Count has been carried out by volunteers under the auspices of the National Audubon Society since 1900. It replaced an earlier tradition of the "Christmas how many birds can I kill for no reason" contest. It is one of the longest records of census data for birds in the world and as such these data have been critical to understanding bird populations and trends in North America.

Download the file rebnut_US-VA_1-110.csv
This file contains data about the red-breasted nuthatch in Virginia. This bird breeds only in a limited area in Virginia but is a regular visitor in the winter in most of the state.

1. Examine the header of the data. It tells you what each field represents. Write a program to read in the file into appropriate lists/arrays. Use array functions to compute the minimum, the maximum, and the mean of the observations of the number of red-breasted nuthatches observed. Print the maximum and the corresponding year, the minimum and the corresponding year, and the mean. Write out a file containing only the year and the count. Plot the number as a function of the year. Fortran: use any method you wish to plot the values from the file you just wrote. Excel is fine. Python: plot the data directly using Matplotlib before writing the data.
2. Read in the file you produced in Part 1. We can approximate the derivative with the following formula:

$$f'(t) \approx \frac{f(t+dt) - f(t)}{dt}$$

Compute the derivative and plot it as a function of time. Fortran: compute the derivative, write it to a CSV file appropriately, and use Excel or any other method to plot it. Python: read and plot using Matplotlib in the same program.