

Calculations

Problem 1

Based on the land average temperature column, calculate the yearly averages for each year between 1760 and 2015 (the average of the twelve months of each year). One average per year. Ignore the years 1750-1759.

Code Execution: (screenshot of the code output)

Question 1

Year	Avg Temp(C*)
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1760	7.185167
1761	8.772500
1762	8.606500
1763	7.496750
1764	8.400333
1765	8.251917
1766	8.405667
1767	8.221500
1768	6.781333
1769	7.694583
1770	7.691917
1771	7.853167
1772	8.193500
1773	8.221500
1774	8.772167
1775	9.183083
1776	8.304000
1777	8.256250
1778	8.542250
1779	8.983250
1780	9.432917
1781	8.102583
1782	7.901250
1783	7.680833
1784	7.862000
1785	7.363000
1786	8.258167
1787	8.031833
1788	8.447167
1789	8.334167
1790	7.982333
1791	8.234250
1792	8.089000
1793	8.229167
1794	8.526000
1795	8.350333
1796	8.271000
1797	8.510583
1798	8.670250
1799	8.505750
1800	8.484250
1801	8.589667

1970	8.700917
1971	8.599250
1972	8.499583
1973	8.948250
1974	8.467500
1975	8.744833
1976	8.347250
1977	8.850250
1978	8.692750
1979	8.733417
1980	8.980333
1981	9.165833
1982	8.639167
1983	9.028167
1984	8.691833
1985	8.658000
1986	8.833583
1987	8.994417
1988	9.201583
1989	8.922000
1990	9.234167
1991	9.179417
1992	8.836583
1993	8.866583
1994	9.038750
1995	9.347083
1996	9.038917
1997	9.202583
1998	9.522667
1999	9.285083
2000	9.201167
2001	9.414583
2002	9.570417
2003	9.525583
2004	9.324583
2005	9.700917
2006	9.532500
2007	9.732167
2008	9.431750
2009	9.505250
2010	9.703083
2011	9.516000
2012	9.507333
2013	9.606500
2014	9.570667
2015	9.831000

Output:

Average temperature for 1760 is 7.185
Average temperature for 1761 is 8.772
Average temperature for 1762 is 8.607
Average temperature for 1763 is 7.497
Average temperature for 1764 is 8.400
Average temperature for 1765 is 8.252
Average temperature for 1766 is 8.406
Average temperature for 1767 is 8.222
Average temperature for 1768 is 6.781
Average temperature for 1769 is 7.695
Average temperature for 2006 is 9.532
Average temperature for 2007 is 9.732
Average temperature for 2008 is 9.432
Average temperature for 2009 is 9.505
Average temperature for 2010 is 9.703
Average temperature for 2011 is 9.516
Average temperature for 2012 is 9.507
Average temperature for 2013 is 9.607
Average temperature for 2014 is 9.571
Average temperature for 2015 is 9.831

Purpose:	Conflicts:	Outputs/Analysis:	How we would approach next time:
To demonstrate statistics that provide a deeper understanding of how the average temperature, in Celsius, has varied across each year between 1760 and 2015. This encompasses the impact on a level, during historical periods.	When it comes to difficulty, per question question 1 was the one that received the attention. The main challenge with this question revolved around reading data. This was a bit tricky because there were methods to read files and it took some time to figure out the best approach. Another issue that arose was with arrays. Transferring the data,	The output reveals the details, about how the average temperature in Celsius fluctuated between 1750 and 2015 starting at 7.18 and reaching 9.83. Upon analyzing the provided information it becomes evident that the yearly averages from 1760 to 2015 exhibit a pattern of alternating increases and decreases than remaining constant.	A straightforward method of coding for this issue next time would be advantageous, along, with developing functions to enhance the program. In particular, utilizing array pointers to allocate the percentage values would be helpful.

	from the file into those arrays also posed some difficulties	However, there is a rise of 2.64 degrees, between the final years.	
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C operations we used to answer question #1 (Explanation of code)

Variable Declarations, at the Beginning:

- Initializing variables such as count i and n. The count keeps track of the processed months for the current year while I acts as an index for storing yearly averages.
- Defining a character array temp[MAX_LENGTH] to hold each line read from the file.
- Using pointer variables token, monthlyavg and year for string manipulation purposes after splitting the line.
- Utilizing floating point variables like currentyearlyavg and yearaverage[255] to calculate the average store an array of yearly averages, dmonthlyavg for monthly average as a double centuryavg[MAX_LENGTH] century, along with other unused variables within this excerpt.

Reading and Initializing the file:

1. File Access and Line Reading;

Assuming that the file has already been opened (omitted we employ fgets to read each line into the temp buffer.

2. Parsing Individual Lines;

Anticipating data in a format, like "year month temperature " we employ strtok to separate out the year and monthly average temperature. The year and month are separated by a dash. Only the year is relevant here.

3. Filtering and Data Conversion;

The year extracted from the line is changed from a string to an integer using atoi. The process continues only if the year falls within the specified range (from 1760).

The average monthly temperature string is converted to a double precision floating point number using atof.

4. Calculating Averages;

For each entry the monthly average temperature is added to currentyearlyavg and count is increased. When count reaches 12 (indicating processing of data for a year) the code calculates the average temperature by dividing currentyearlyavg by 12.

The annual average is then saved in the yearaverage array. Counters are reset, for the year.

Finalizing and Outputting Results;

The loop runs until reaching the end of file (feof(file) returns true).

Once all data has been processed the file is closed with fclose(file).

Finally a header is printed out followed by displaying each year (starting from 1760) alongside its corresponding calculated temperature stored in the yearaverage array