SAMPLE QL ASSIGNMENT

Since 1959, researchers from the Scripps Institution of Oceanography and the National Oceanic and Atmospheric Administration have been measuring the amount of carbon dioxide (CO_2) in the air at the Mauna Loa Observatory in Hawaii. Their data are available at: https://gml.noaa.gov/ccgg/trends/data.html. CO_2 concentrations are reported in parts per million (ppm), with higher numbers indicating a greater amount of CO_2 in the air.

1. Why would scientists care about the concentration of CO_2 in the air? That is, why are the data from the Mauna Loa Observatory potentially important?
2. Below is a table showing the mean (i.e., average) CO_2 concentration at the Mauna Loa Observatory for each year between 1959-2024. Use these data to create a graph that shows how CO_2 concentrations have changed during that time.

YEAR	Mean CO2 Concentration (ppm)
1959	315.98
1960	316.91
1961	317.64
1962	318.45
1963	318.99
1964	319.62
1965	320.04
1966	321.37
1967	322.18
1968	323.05
1969	324.62
1970	325.68
1971	326.32
1972	327.46
1973	329.68
1974	330.19
1975	331.13
1976	332.03
1977	333.84
1978	335.41
1979	336.84
1980	338.76
1981	340.12
1982	341.48
1983	343.15
1984	344.87
1985	346.35
1986	347.61

1987	349.31
1988	351.69
1989	353.2
1990	354.45
1991	355.7
1992	356.54
1993	357.21
1994	358.96
1995	360.97
1996	362.74
1997	363.88
1998	366.84
1999	368.54
2000	369.71
2001	371.32
2002	373.45
2003	375.98
2004	377.7
2005	379.98
2006	382.09
2007	384.02
2008	385.83
2009	387.64
2010	390.1
2011	391.85
2012	394.06
2013	396.74
2014	398.81
2015	401.01
2016	404.41
2017	406.76
2018	408.72
2019	411.65
2020	414.21
2021	416.41
2022	418.53
2023	421.08
2024	424.61

3. In no more than a few sentences, describe the pattern (shown in your graph) of the change in CO_2 concentrations that occurred between 1958 and 2024. In your opinion, is that pattern easier to discern when looking at the graph than when looking at the table of raw data? Why or why not?
4. The data from the Mauna Loa Observatory indicates that the mean (i.e., average) concentration of CO_2 in the air went from 421.08 ppm in 2023 to 424.61 ppm in 2024. That is an increase of 3.53 ppm over the course of one year. If the mean concentration of CO2 increases by 3.53 ppm each year in the future, what will be the mean concentration of CO_2 in the air for each of the next 20 years? For full credit, use one of the analytics tools you've learned in class to answer this question, and explain how and why you used it.
5. Looking at the graph you created in #2, do you think it is reasonable to assume that the mean concentration of CO_2 will increase 3.53 ppm for each of the next 20 years? If so, why? If not, do you think the actual increase will be higher or lower?
6. What are the implications of the work you've done above? Do you think scientists (including those at the Mauna Loa observatory) would be interested in your analyses? Why or why not?