
Problem Set One

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1. FITTING TRENDS OVER THE ENTIRE DATA SERIES

1A.

The average increase of CO_2 concentration per year from the linear regression model of CO_2 concentration with time (with 1958 as origin) is 1.520, and the average increase per decade is 15.20.

1B.

Taking the time data, with origin 0 set as year 1958 and with year 2016 represented as 58, we will arrive at a nominal start-point of 307ppm and endpoint of 395.16ppm

The start-point of the data is 315.71ppm or 8.71ppm higher than trend-predicted, and the end-point is 402.25ppm or 7.19ppm higher.

1C.

The standard deviation of the data-misfit residual, or the residual standard error, is 3.871 on 700 degrees of freedom. The F variance ratio, or statistic, is 30880.

1D.

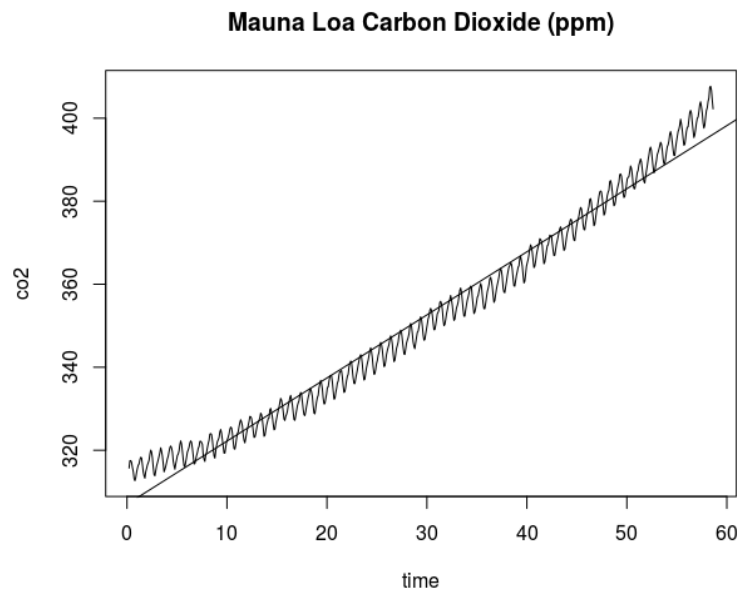


Figure 1.1: Regression of time(with 1958 as origin) and Mauna Loa Carbon Dioxide Data

The data does not seem to follow strictly to a straight line, in fact, it appears to be have an exponential trend with a small enough exponent that it takes on pseudo-linear characteristics.

Also, the linear prediction fails to take into account the saw-tooth motion that the data is taking, or the trend within the trend.