Topic 4 problems: the general linear model

1. Load the Keeling curve from `keeling.Rdata`. Use the R function `lm()` to fit a straight line to the `co2_fill` column as a function of the `date_float` column. This fit will capture the overall rate of increase of CO_2, but not the acceleration of the increase or the sinusoidal within-year fluctuations. Plot the data and the linear fit.

2. Use `lm()` to fit a quadratic function $f(x) = b_1 + b_2 x + b_3\, x^2$ to the same data. This fit will capture the overall increase and the acceleration, but not the sinusoidal within-year fluctuations. Plot the data and the fitted curve.

3. Add a sinusoidal term to $f(x)$ in the previous problem to capture the within-year fluctuations, and use `nls()` to fit this new function to the data. Plot the data and the fitted curve.