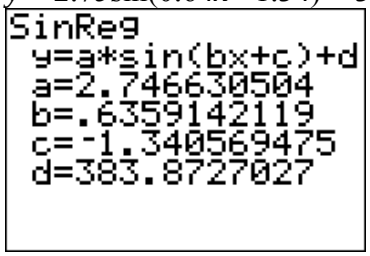
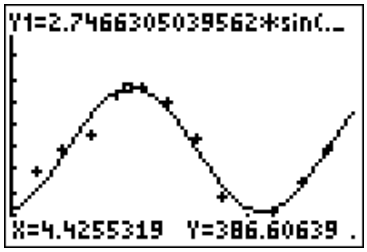
Chapter 8 Task Level 3 Sample Solution

a) Each year, the CO_2 levels seem to peak during months 4, 5 and 6 (April to June) and have a minimum level in month 9 or 10 (September to October). Over the years 2003 to 2007, the CO_2 levels show an overall increase, with the minimum in 2007 being greater than the maximum for 2003.

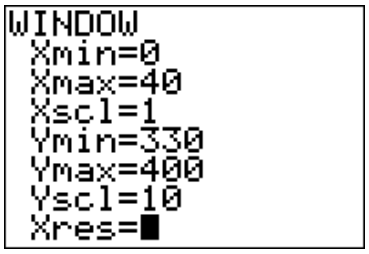
b) I used the data for 2007. The approximate sine function that fits the data is $y = 2.75\sin(0.64x - 1.34) + 383.87$.

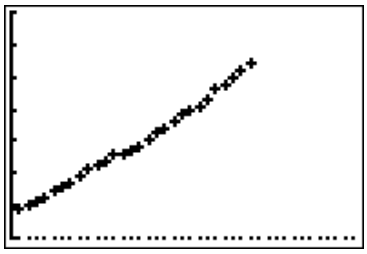




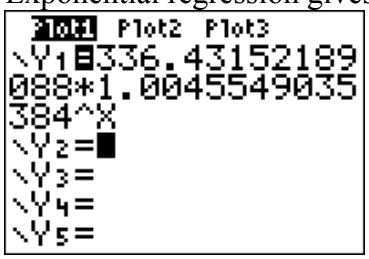
c) The rate of change over the five years is 0.15 ppm per month, or 1.8 ppm per year.

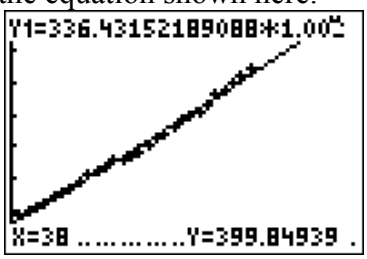
d) I let 1980 be year 1 and then numbered each year up to 28, then plotted the data using this Window.



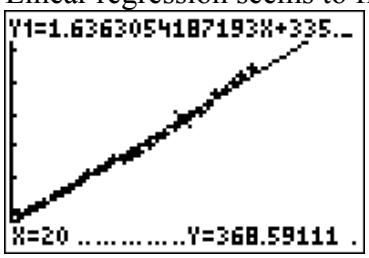


The resulting graph looks exponential or linear.
Exponential regression gives the equation shown here.





Linear regression seems to fit well too: see graph below.



e) Using the exponential model, the CO_2 emission level in 2017 will be 399.85 ppm. Using the linear model it will be 398.04 ppm.

f) The average rate of change for the years 1980-2007 is 1.61 ppm per year. Comparing this with the rate for the years 2003 to 2007, it can be seen that with time the annual rate of change is increasing.

g) This data does show a general increase in carbon dioxide levels over the 48 years. This increase in pollution levels may be a cause of global warming, health problems, problems for agriculture and so on.