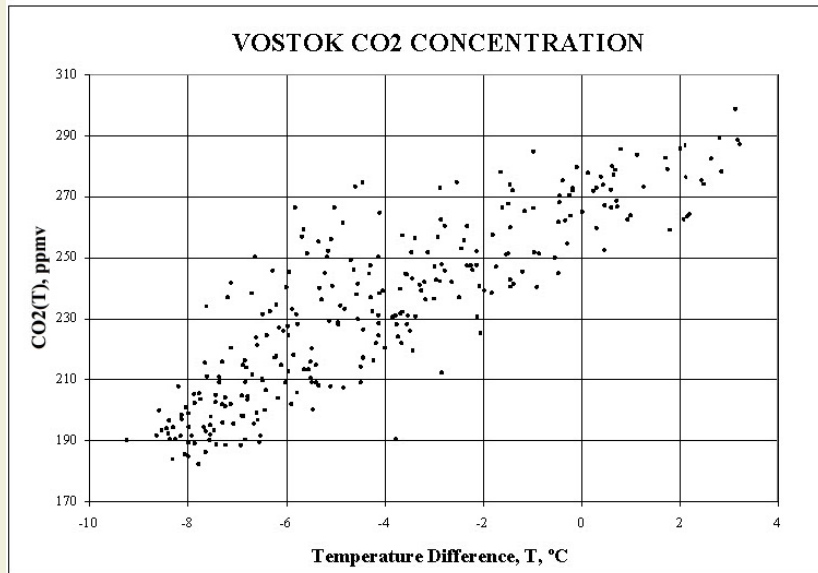
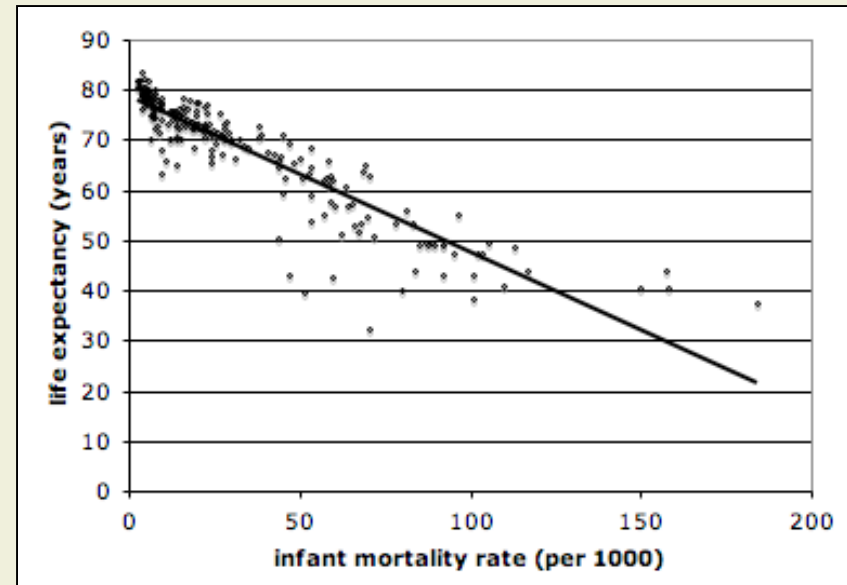


# Scatter Plots

Scatter plots are graphs of paired sets of data (x,y). Each pair is represented by a point. Points are not connected.



Positive Correlation

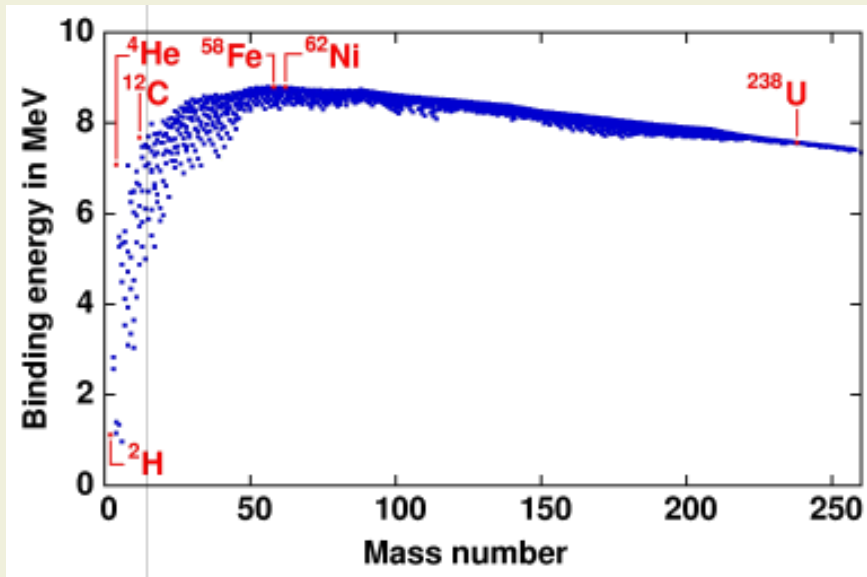


Negative Correlation

Correlation does not imply cause!

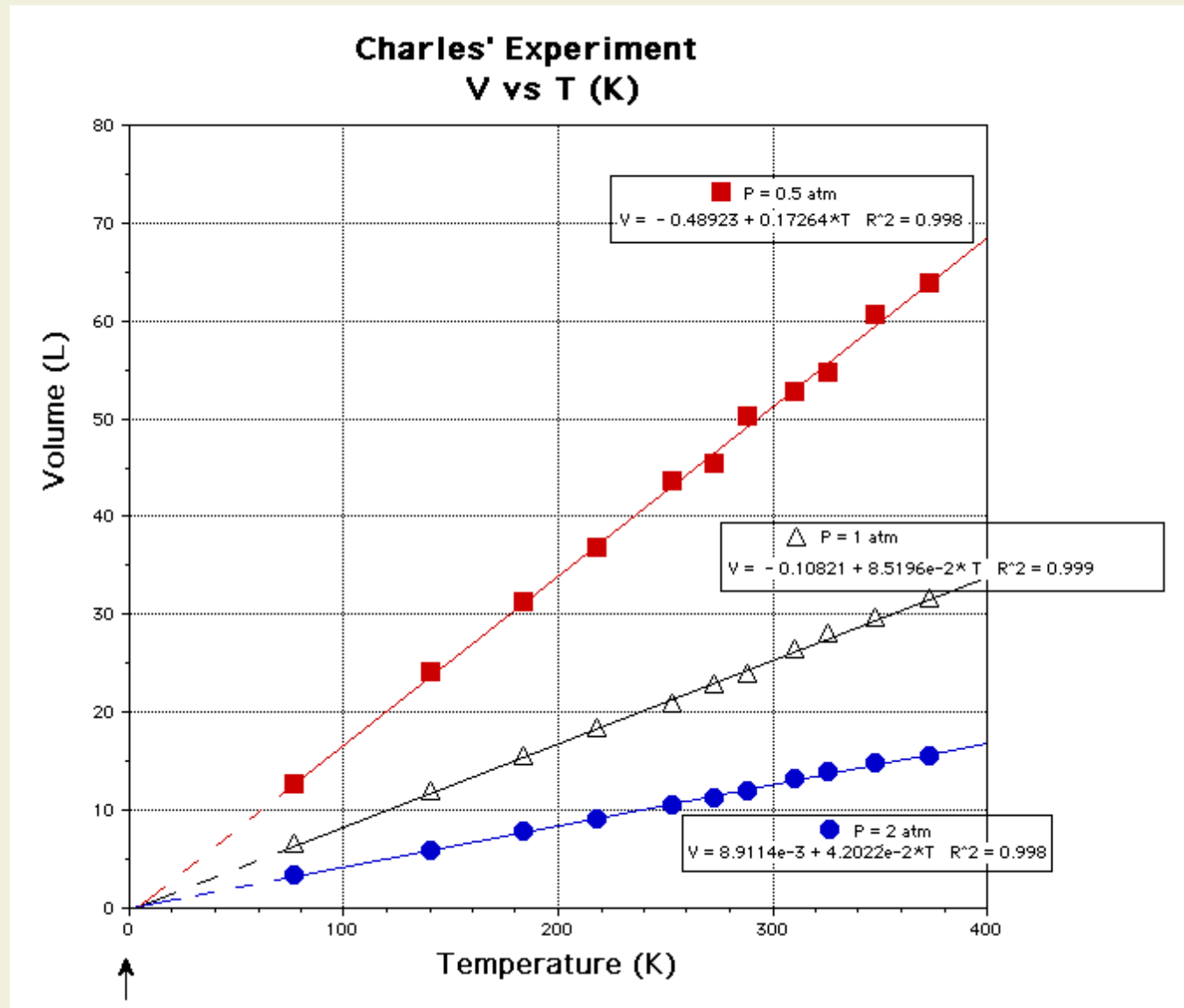
# Non-Linear Correlation

Binding Energy per Nucleon vs Atomic Mass



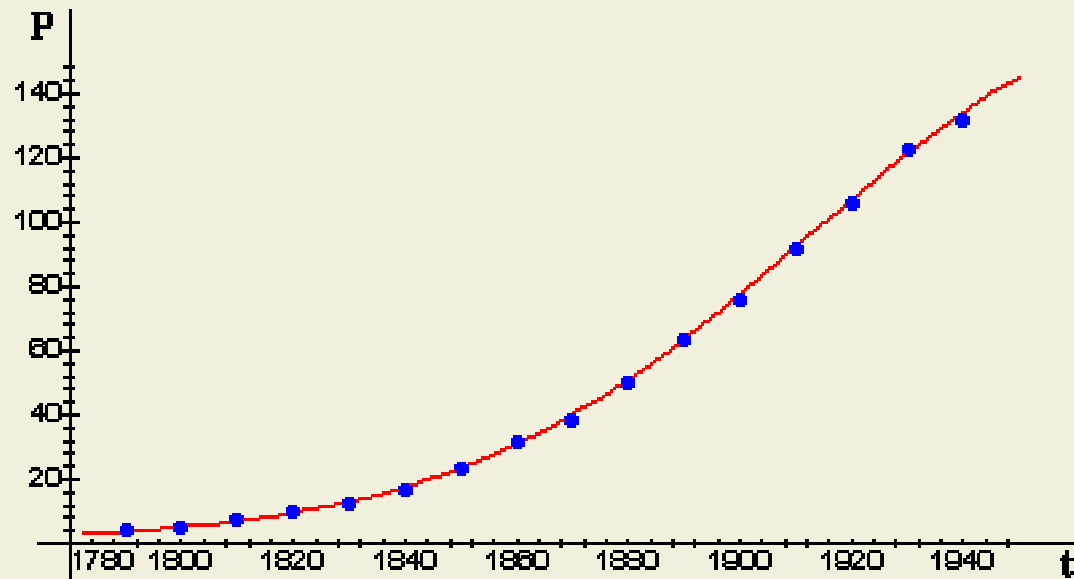
Non-linear correlation

# Relations and Functions



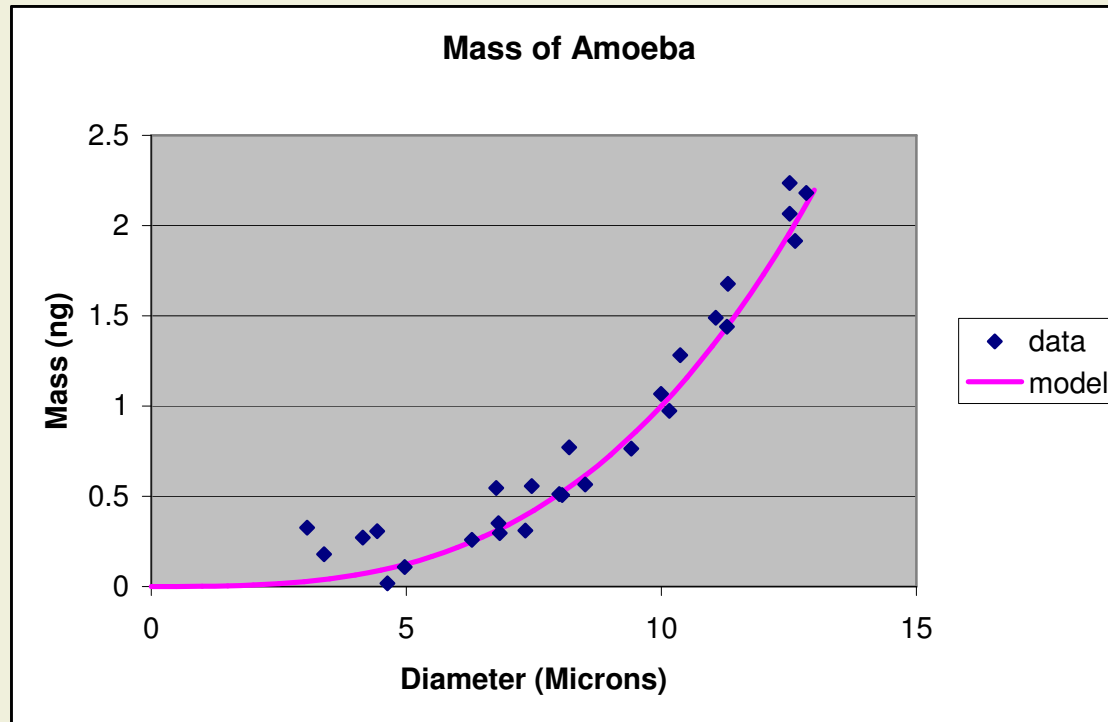
# Relations and Functions

US population in millions versus time



# Relations and Functions

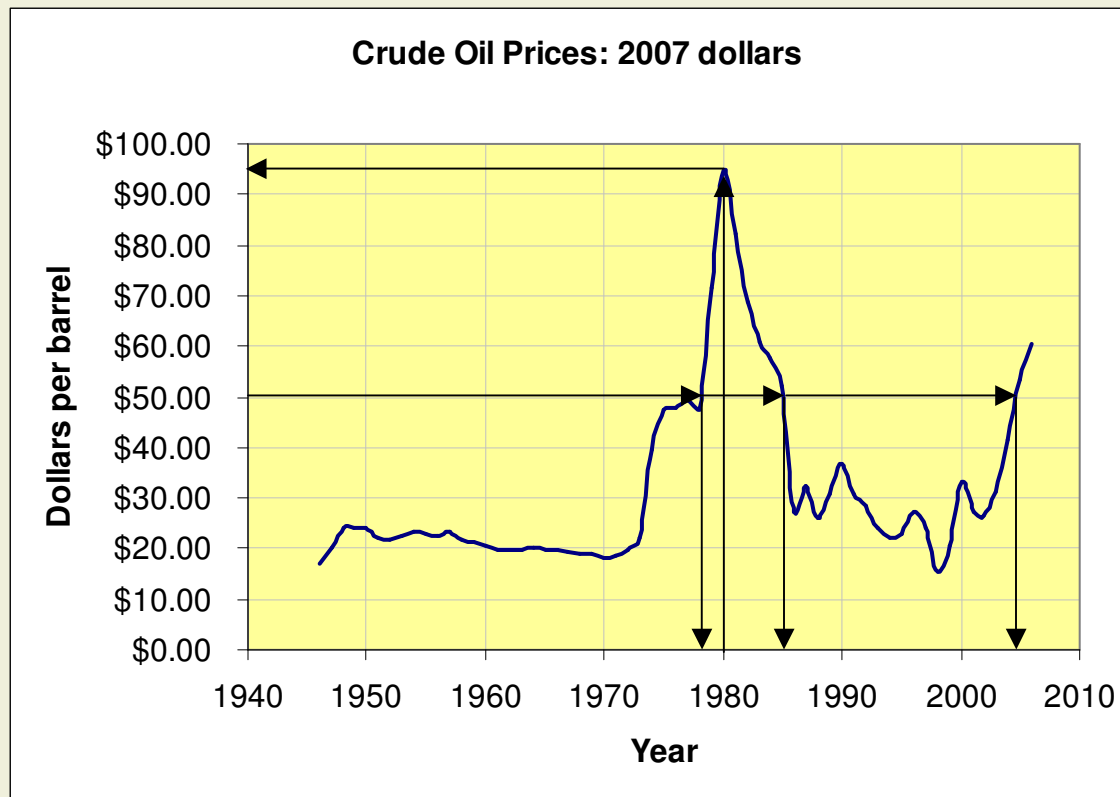
What function would be a good model for this data?



## Relations and Functions

Consider the function  $f$  described by the graph of  $y=f(x)$  below, where  $y$  is the price of a barrel of oil and  $x$  is the time in years AD.

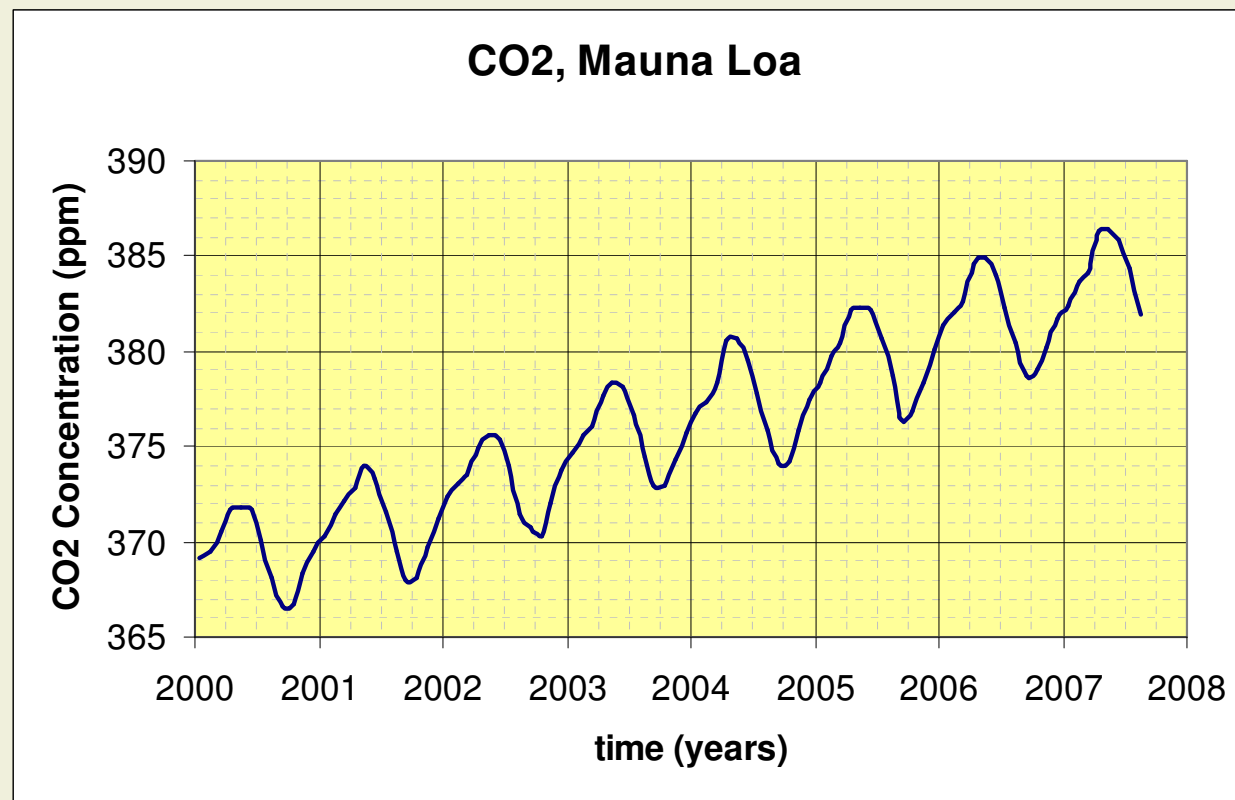
1. What is  $f(1980)$ ?
2. If  $f(x)=50$  find  $x$ .



## Relations and Functions

Consider the function  $f$  described by the graph of  $y=f(x)$  below, where  $y$  the atmospheric  $\text{CO}_2$  concentration in (ppm) and  $x$  is the years AD.

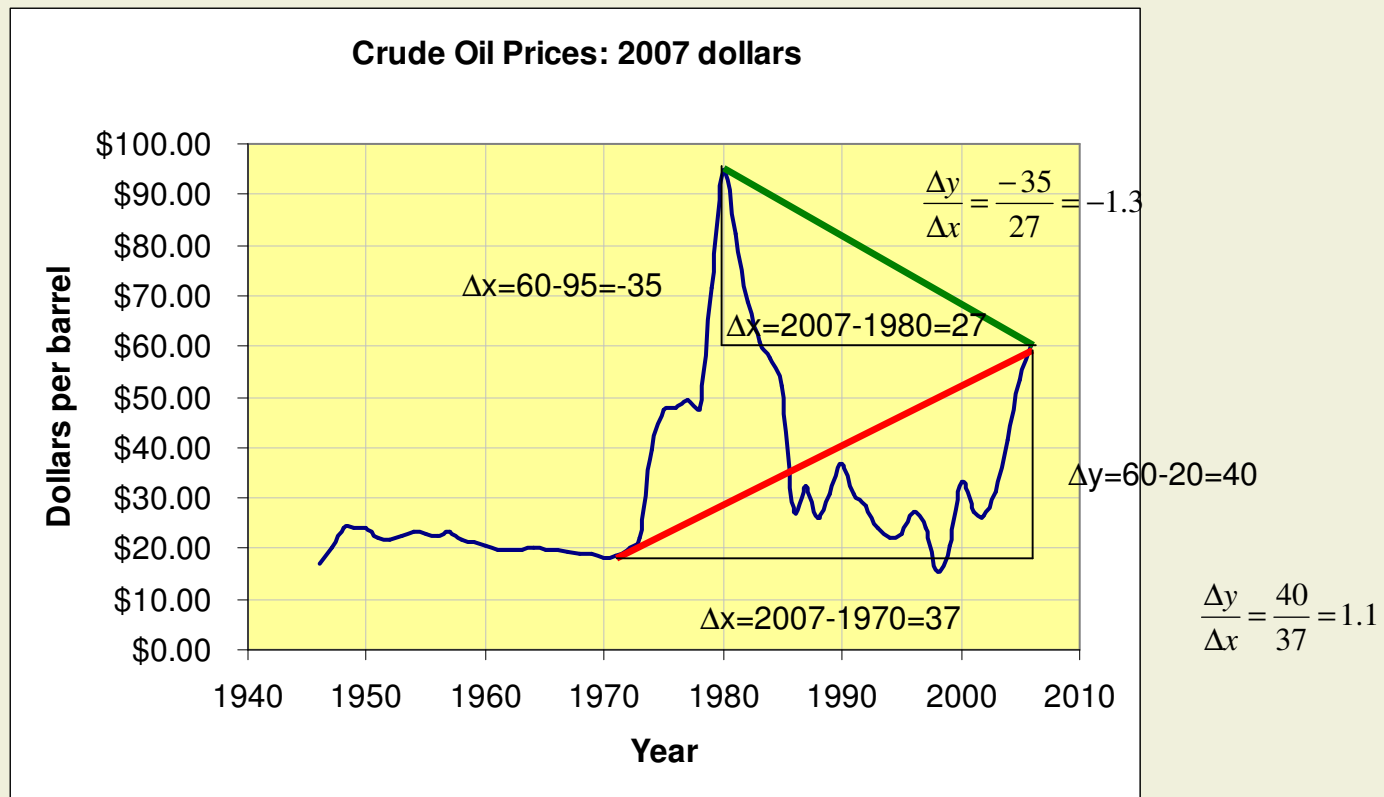
1. What is  $f(2001)$ ,  $f(2007)$ ?
2. If  $f(x)=385$  find  $x$ .



# Rates of Change

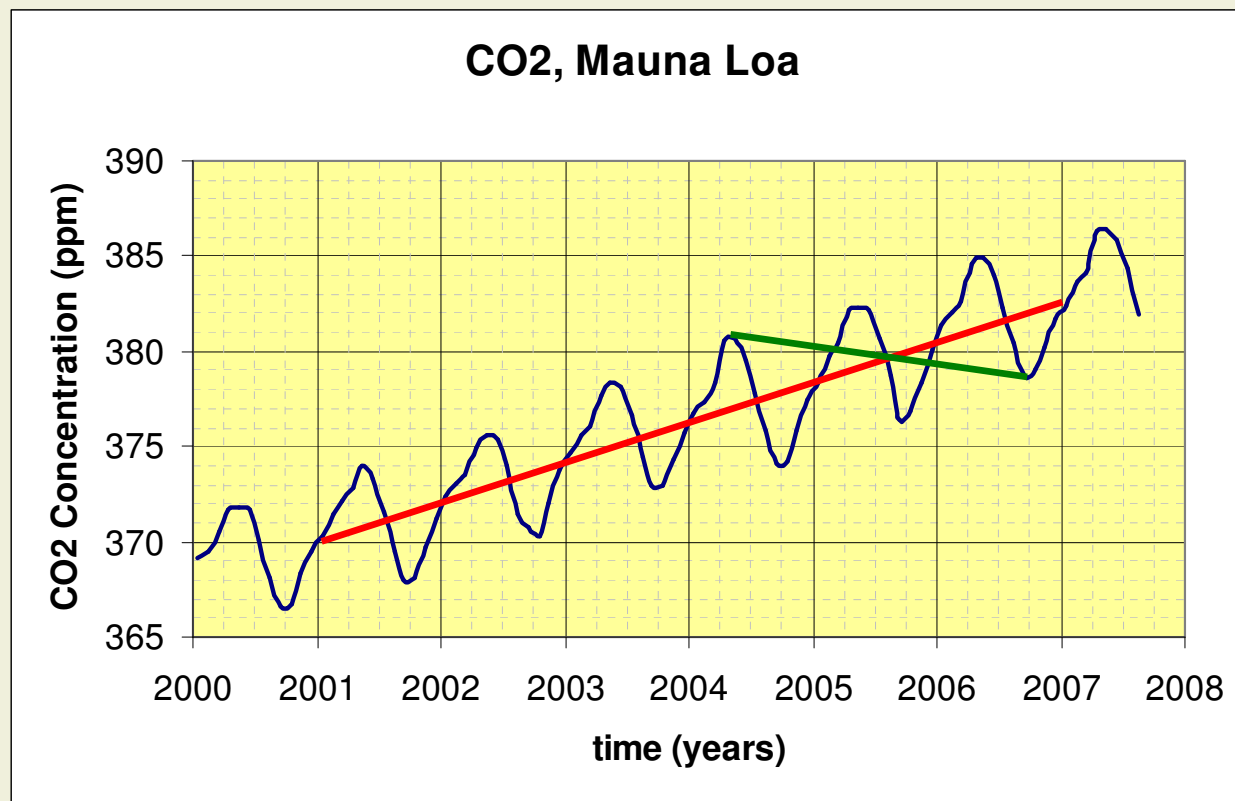
Consider the function  $f$  described by the graph of  $y=f(x)$  below, where  $y$  is the price of a barrel of oil and  $x$  is the time in years AD.

1. What is the average rate of change in prices between 1970 and 2007?
2. What is the average rate of change in prices between 1980 and 2007?



## Rates of Change

1. Find the average rate of change in  $\text{CO}_2$  concentration between January 1<sup>st</sup> 2001 and January 1<sup>st</sup> 2007.
2. Find the average rate of change in  $\text{CO}_2$  concentration between April 1<sup>st</sup> 2004 and October 1<sup>st</sup> 2006.



# Linear Functions

## Determining a Line from Two Points

eg. A copper rod is measured to be 76.45 cm when the temperature is 15 oC and 76.56 cm when the temperature is 100 oC. Find the equation for the length,  $L$ , as a function of the temperature  $T$  assuming a linear fit.

# Linear Functions

## Determining a Line from a Rate and a Point

eg. Six year old children are expected to grow at a rate of 2 inches per year. Assuming a linear growth rate find the equation for the height of a child who is 4ft at the age of six.

## General Equation of Line

General Equation of a Line:

$$Ax+By=C$$

eg. You have \$20 dollars to spend on fruit for a party. Apples cost 80 per pound and bananas cost 50 cents per pound. Let  $x$  be the amount of apples you purchase and  $y$  be the amount of bananas. If you want to spend all your money on either apples or bananas find a equation constraining the amount of each that you can buy.

If you think of the amount of bananas you can buy as a function of the amount of apples you choose to buy, what is the domain of that function

# Linear Functions

1. Find the equation of the red trend line in the form  $y=mx+b$ , where  $x$  is years since 2000 and  $y$  is concentration of  $\text{CO}_2$  in ppm.

