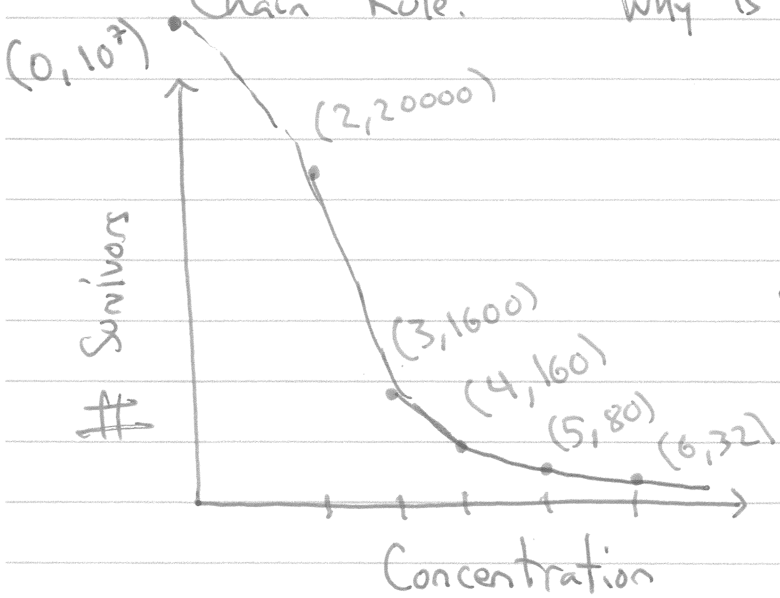
Today: • Data Fitting + spreadsheet

• Chain Rule.



Why is $y=ax$ not useful?

• Decreasing!

• When $x=0$, want $y=10^7$

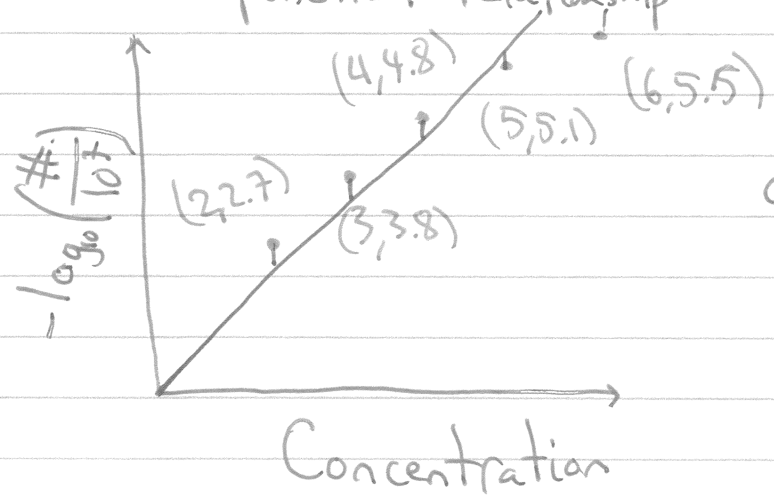
• As $x \to \infty$, want $y \to 0$

Looks like exponential decay

(will define in 1 week)

If x & y have an exponential relationship $\rightarrow$ x & $\boxed{-\log_{10}}\left(\frac{y}{10^7}\right)$

next week.



Best fit $y=ax$

$$a = \frac{x_1y_1 + x_2y_2 + \cdots + x_5y_5}{x_1^2 + x_2^2 + \cdots + x_5^2}$$

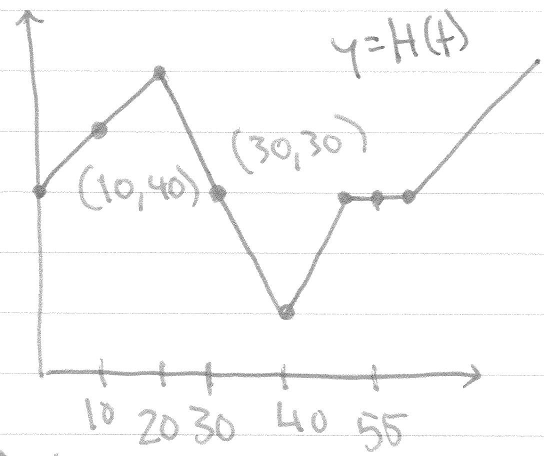
$$= \boxed{\frac{2\cdot 2.7 + 3\cdot 3.8 + 4\cdot 4.8 + \cdots + 6\cdot 5.5}{2^2 + 3^2 + 4^2 + \cdots + 6^2}}$$

<u>Chain Rule:</u>

$$\boxed{\text{Pollution}} \xleftarrow{P(H)=H^2} \boxed{\text{Humans}} \xleftarrow{H(t)} t$$

$$\boxed{f'(t) = f'(g(t)) \cdot g'(t)} \quad \text{or} \quad \frac{dP}{dt} = \boxed{\frac{dP}{dH}} \cdot \boxed{\frac{dH}{dt}}$$

rates of change



If $P = H^2$ } Chain Rule

$$\frac{dP}{dt} = 2H \cdot \frac{dH}{dt}$$

$\frac{dP}{dH}$

a) $t=30$

$$\frac{dP}{dt} = 2H \cdot \frac{dH}{dt} = 2(30) \cdot (-2) = -120$$

b) $t=10$

$$\frac{dP}{dt} = 2H \cdot \frac{dH}{dt} = 2(40) \cdot 1 = 80$$

c) $t=55$ $\frac{dH}{dt} = 0$

$$\frac{dP}{dt} = 2H \cdot 0 = 0$$