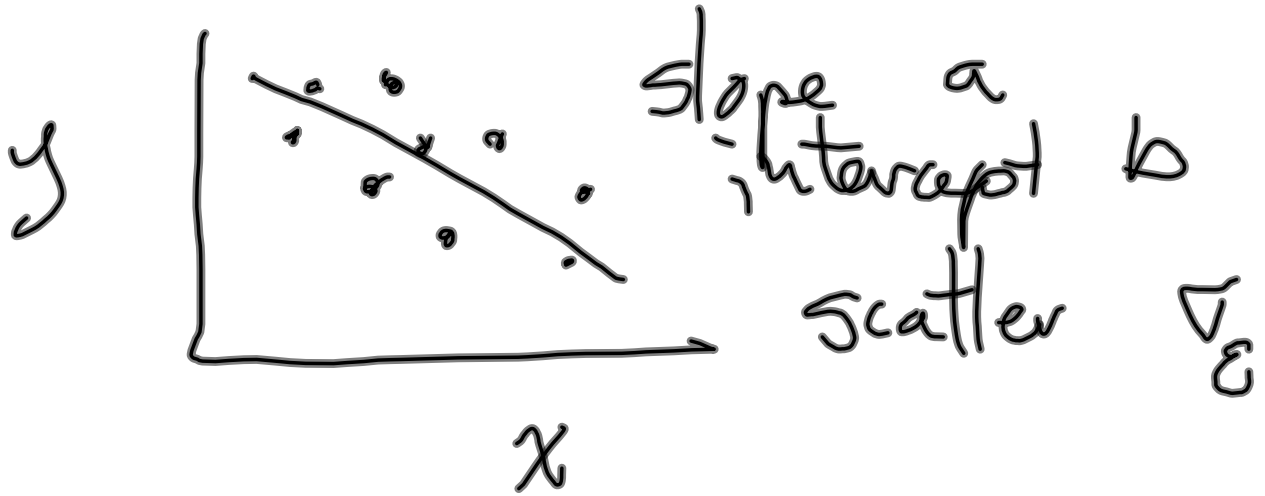
Linear Regression

predict y

(y is measurable)

$$y = ax + b + \varepsilon$$

σ_ε^2



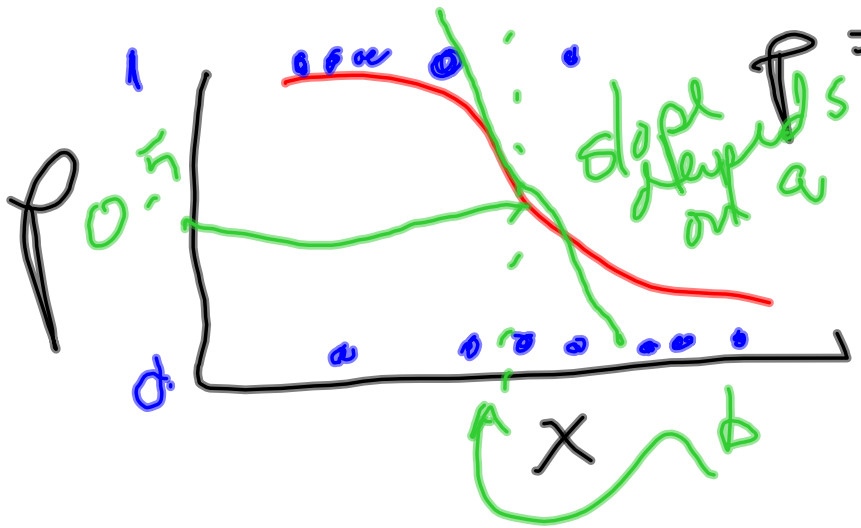
slope a

intercept b

scatter σ_ε

Logistic Regression

predict probability p (fraction) of 1 in a sample of 0s and 1s "presence" or "absence"



slope depends on a

$$p = \frac{e^{ax}}{b + e^{ax}}$$

$p = 1/2$ when

$p = 1/2$ when $ax_{1/2}$

$$\frac{1}{2} = \frac{e^{ax_{1/2}}}{b + e^{ax_{1/2}}}$$

$$b + e^{ax_{1/2}} = 2e^{ax_{1/2}}$$

$$b = e^{ax_{1/2}}$$

$$ax_{1/2} = \ln(b)$$

$$x_{1/2} = \frac{\ln(b)}{a}$$

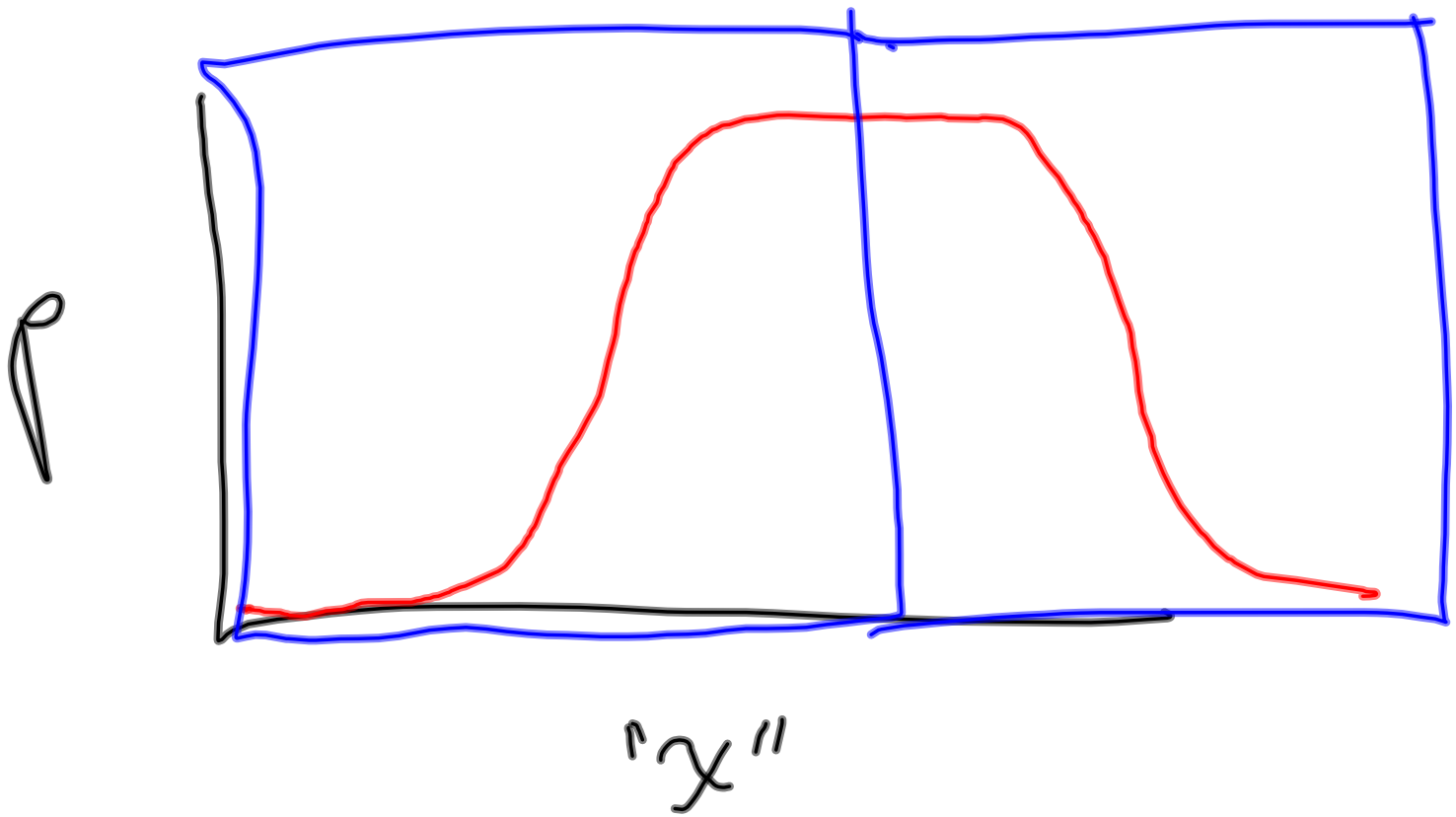
Extension of Logistic Regression to multiple predictor variables:

additional parameters to estimate

$$\chi = c_0 + c_1 z_1 + c_2 z_2 + \dots$$

explanatory factors measure

"Maximum Likelihood Combination" of $(a, b, c_0, c_1, \dots)$ maximizes joint of the data


ρ
"x"

$$\int \frac{1}{x}\,dx = \ln_e x$$

$$\sqrt{-1} = i$$

$$e^{2\pi i} = 1$$

total # N

sample without m

probability that all N are red?

$$p(N=N|m) = \frac{m+1}{N+1}$$