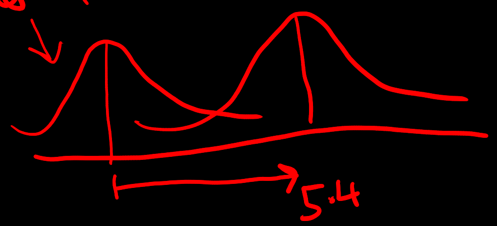
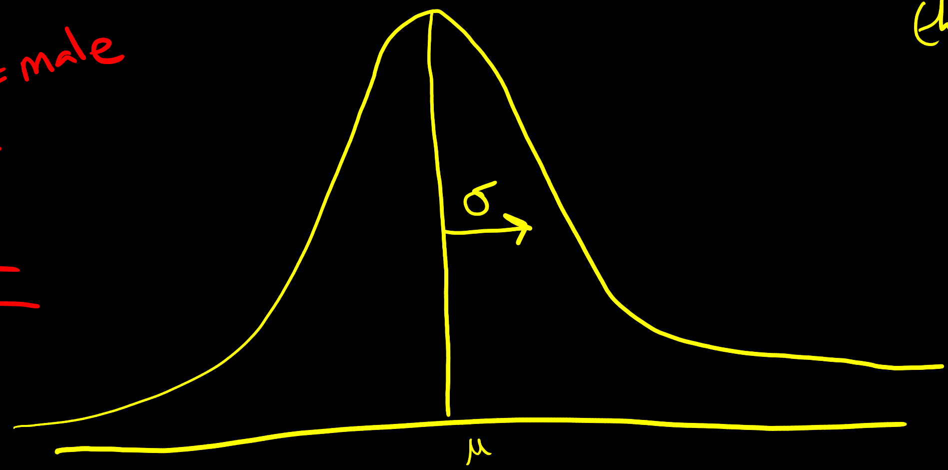
people

170 cm
35 age
gender = female

→

170 cm
35 age
gender = male





weight

age

height

If height increases by 1cm
then μ increases
by ≈ 0.96

people
170cm 170 cm
35age 35 age

people
170cm 171 cm
36age 35 age

$y_1 \quad y_2 \quad y_3 \ldots \quad y_n$ each $y_i \in \{0,1\}$

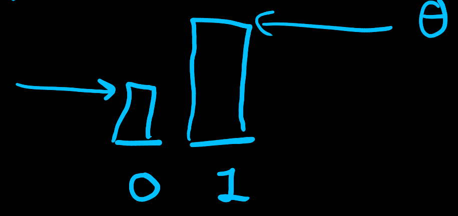
normal linear

for each i in $1 \ldots n$

$$\boxed{y_i \sim N(\mu_i, \sigma^2)}$$

$$\boxed{\mu_i = \beta_0 + \sum_{k=1}^{K} \beta_k x_{ki}}$$

Bernoulli



$p(x=1) = \theta$

$p(x=0) = 1-\theta$

$$\boxed{\begin{aligned} &y_i \sim \text{Bernoulli}(\theta_i) \\ &\theta_i = \beta_0 + \sum_{k=1}^{K} \beta_k x_{ki} \end{aligned}}$$

$\theta_i \in (0,1)$

$\phi_i \in (-\infty, \infty)$

logit (log odds)

$$\phi = \overbrace{\log\left(\frac{\theta}{1-\theta}\right)}^{\text{logit (log odds)}}$$

$$\theta = \underbrace{\frac{1}{1+e^{-\phi}}}_{\text{inverse logit}}$$

ilogit

$$\log\left(\frac{\theta}{1-\theta}\right) \quad \theta_i \xrightarrow{\text{link}} \phi_i \xrightarrow{\text{ilink}} \theta_i$$

$$\phi_i = \beta_0 + \sum_{k=1}^{k=K} \beta_k x_{ki}$$

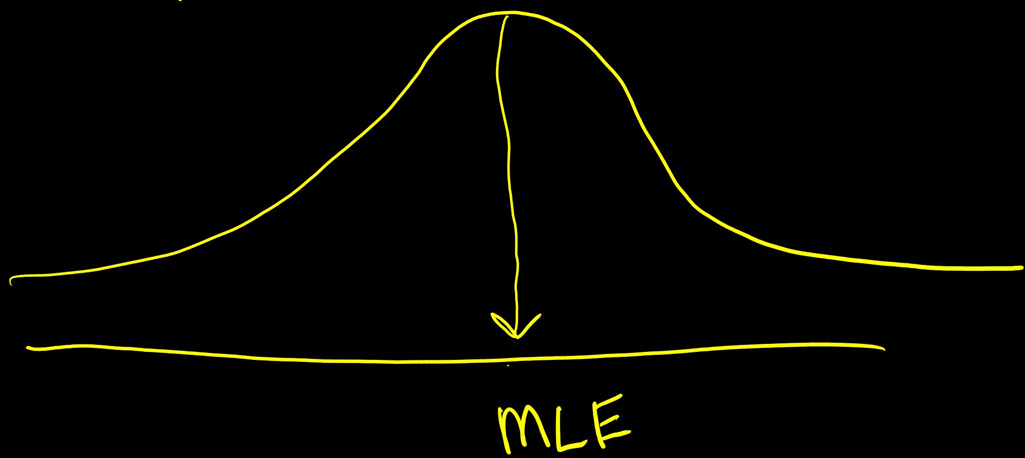
log odds $\longrightarrow$ P

$$\log p(\text{data} \mid \beta_{MLE})$$

logLik(m5)

log likelihood

likelihood function



$$\frac{P(\text{data} \mid M_1)}{P(\text{data} \mid M_0)} \quad : \quad \text{likelihood ratio}$$

$$\log\left(\frac{P(\text{data} \mid M_1)}{P(\text{data} \mid M_0)}\right) = \underline{\log P(\text{data} \mid M_1) - \log P(\text{data} \mid M_0)}$$

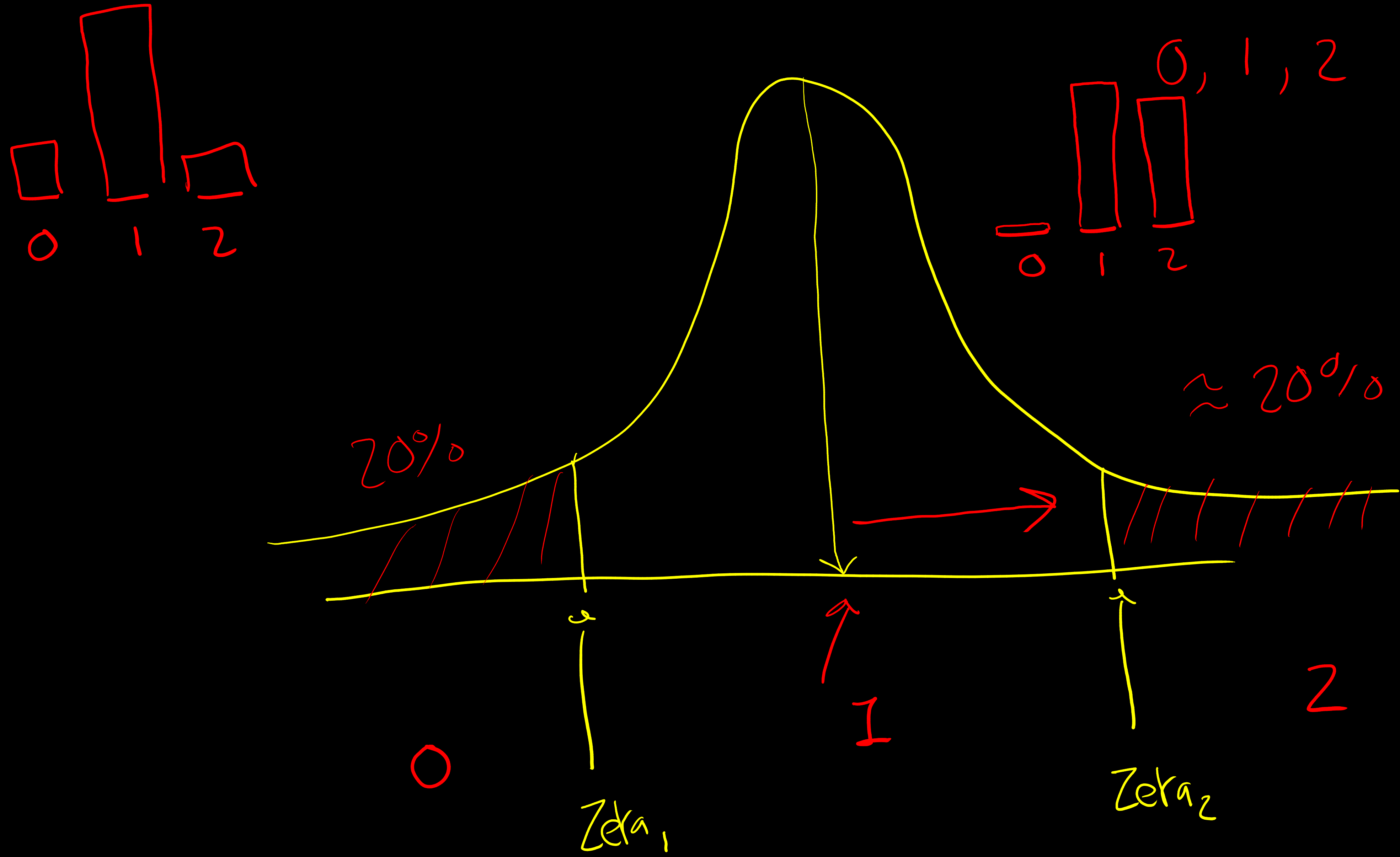
diff. of log likelihood

<u>is</u>

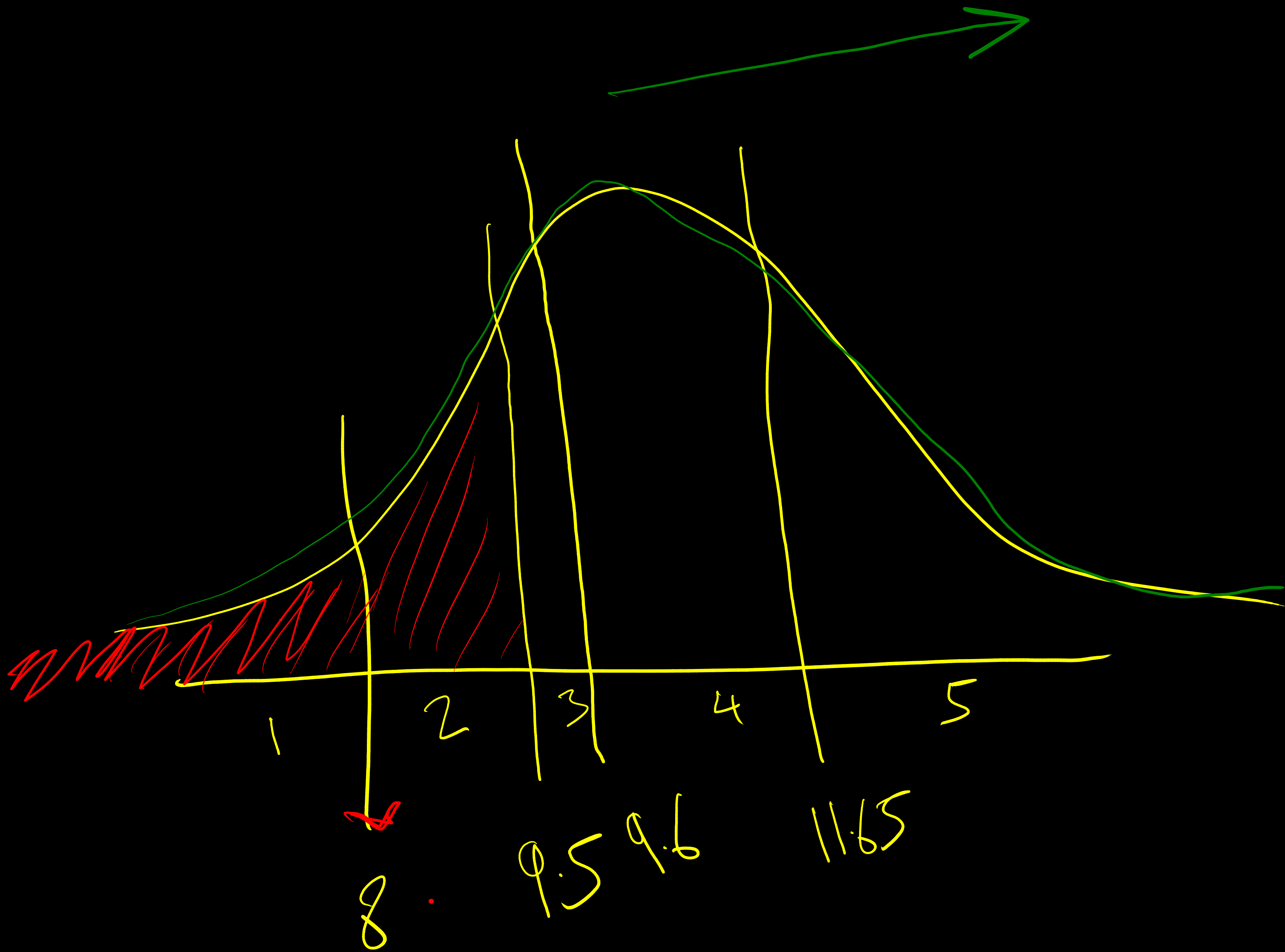
log of the likelihood ratio

$-2LL$ <u>deviance</u>

χ^2



0 1 2
0, 1, 2
0 1 2
20%
≈ 20%
0
1
2
Zeta$_1$
Zeta$_2$


1
2
3
4
5
8
9.5
9.6
11.65

$\log(\text{odds})$

$e^{?} = \text{odds}$

e euler's number

$e \approx 2.71\ldots\ldots$

$2^{10} = 1024$

$\log_2(1024) = 10$

$10^6 = 1000000$

$\log_{10}(1000000) = 6$