today multiparameter problems

$\theta \in \mathbb{R}$ $\quad k = 1$

$(Y_i \mid \theta\, \mathcal{B}) \stackrel{IID}{\sim} p(y_i \mid \theta\, \mathcal{B})$ $\quad (i = 1, \dots, n)$

get MLE $\hat{\theta}_{MLE}$ by usual method.

Q: Define $\gamma = g(\theta)$ for some $g: \mathbb{R} \to \mathbb{R}$; what is $\hat{\gamma}_{MLE}$?

Functional invariance of ML estimates

A: $\hat{\gamma}_{MLE} = g(\hat{\theta}_{MLE})$

Super useful result

applies also when $\underset{\sim}{\theta} = (\theta_1, \dots, \theta_k)$ for $k \geq 1$

LOOCV: leave-one-out cross validation

y_3

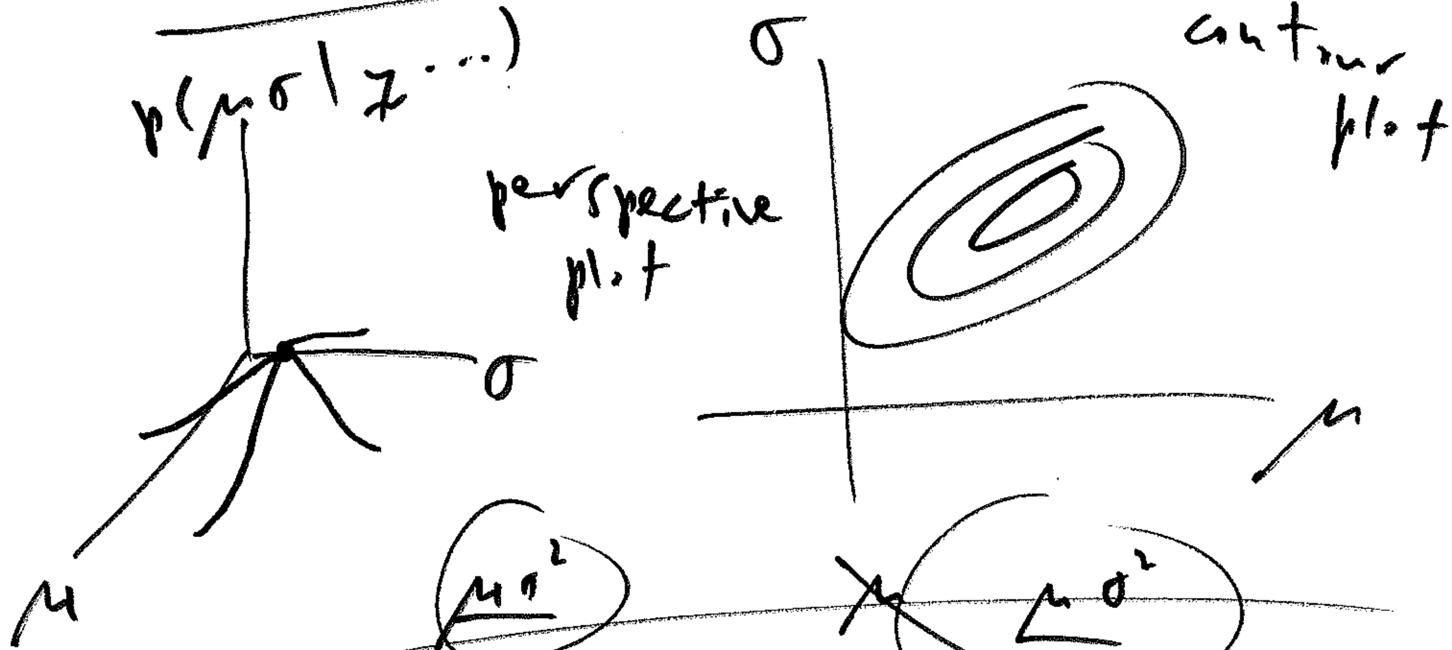
$p(y_3 \mid y_{-3}\, \mathcal{B} \dots)$

comparing y_3 with ( ): scoring

$$(\mu \mid \underset{\sim}{y}\, \mathbb{N}_2, \mathcal{B}) \sim N(\mu_*, \sigma_*^2)$$

$$\frac{1}{\sigma_*^2} = \frac{1}{\sigma_\mu^2} + \frac{1}{\sigma_0^2 / n}$$

$$\begin{pmatrix}\text{posterior}\\ \text{precision}\end{pmatrix} = \begin{pmatrix}\text{prior}\\ \text{precision}\end{pmatrix} + \begin{pmatrix}\text{likelihood}\\ \text{precision}\end{pmatrix}$$

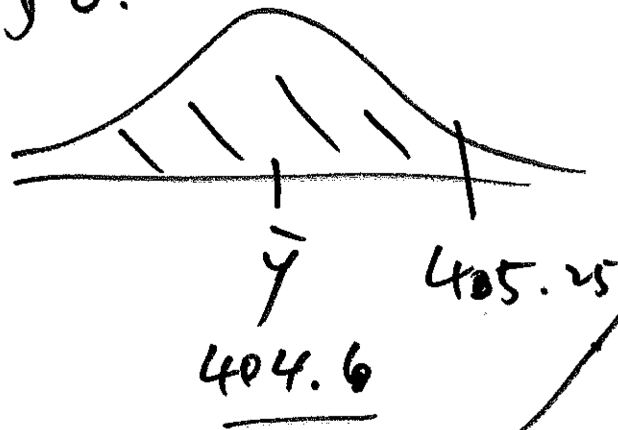


$\mu\,\sigma^2$ $\qquad$ $\mu\,\sigma^2$

$$\boxed{p(\mu\,\sigma^2 \mid \mathcal{B})} = \cancel{p(\mu \mid \mathcal{B}) \cdot p(\sigma^2 \mid \mu\, \mathcal{B})}$$

$$= p(\sigma^2 \mid \mathcal{B}) \cdot p(\mu \mid \sigma^2\, \mathcal{B})$$

5) 0.65



$p(\mu \mid y\, \mathcal{N}_e\, \mathbb{P}_c\, \mathcal{B})$ ← conj. prior

Do data support $(\mu < 405.25)$?

fixed unknown constant

$P_F(\mu < 405.25) =$ undefined

conj.

$P_B(\mu < 405.25 \mid y\, \mathcal{N}_e\, \mathbb{P}\, \mathcal{B}) = \underline{0.85}$

$$(\mu\,\sigma\,\nu \mid \mathcal{B}) \sim p(\mu\,\sigma\,\nu \mid \mathcal{B})$$

$$(Y_i \mid \mu\,\sigma\,\nu\, t\, \mathcal{B}) \overset{IID}{\sim} t_\nu(\mu, \sigma^2)$$

$$(i = 1, \dots, n)$$

$\boxed{Q:}$ conj. prior?

$\boxed{A:}$ no