Lecture 31

31-1

$\frac{x-\mu}{\sigma} \sim z$

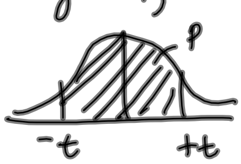
$\frac{x-\mu}{S} \sim t$

pass G.T. $\Sigma_{\delta\delta} = \sigma_0^2 Q_{\delta\delta}$ (→ z)

not pass G.T. $\hat{\Sigma}_{\delta\delta} = \hat{\sigma}_0^2 Q_{\delta\delta}$ (→ t)

$\text{Prob.}\left(-t < \frac{x-\mu_x}{\hat{\sigma}_x} < +t\right) = P$

give P, what is t ?



$\frac{1}{2} + \frac{P}{2} = \frac{1+P}{2}$

$t = \text{icdf}\left('t', \frac{1+P}{2}, r\right)$

conf. intvl : $\hat{x} \pm t\hat{\sigma}_x$

Nov 6-4:22 PM

Confidence regions 1D → 2D

31-2

$z_1^2 + z_2^2 + z_3^2 + \cdots + z_n^2 \sim \chi_n^2$

$(\vec{x}-\vec{\mu}_x)^T \Sigma_{xx}^{-1} (\vec{x}-\vec{\mu}_x)$, suppose $\Sigma = \begin{bmatrix} \sigma_1^2 & 0 & \cdots & 0 \\ 0 & \sigma_2^2 & & \vdots \\ \vdots & & \ddots & \\ 0 & \cdots & & \sigma_n^2 \end{bmatrix}$

$\frac{(x_1-\mu_{x_1})^2}{\sigma_{x_1}^2} + \frac{(x_1-\mu_{x_2})^2}{\sigma_{x_2}^2} + \cdots$

$z_1^2 : \quad z_2^2$

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