$$X_1, \ldots, X_n \mid \mu, \lambda \overset{iid}{\sim} N(\mu, \lambda^{-1})$$

→ assume both $\underline{\mu}$ and $\underline{\lambda}$ are unknown

$\lambda = (\sigma^2)^{-1}$.

Hint: <u>conjugacy</u>

$$\mu \mid \lambda \sim N(m, (c\lambda)^{-1})$$ → module 3

last time, → <u>module 3.</u>

$$\mu \mid x_1, \ldots, x_n \sim N(M, L^{-1})$$

$$\lambda \sim \text{Gamma}(a, b)$$ <u>new part</u>

$$p(\mu, \lambda) = p(\mu \mid \lambda)\, p(\lambda) = N(\mu \mid m, (c\lambda)^{-1}) \times \text{Gamma}(\lambda \mid a, b).$$

This is referred to as the

$$\text{NormalGamma}(\mu, \lambda \mid m, c, a, b).$$

$a, b > 0$

$c > 0$, $m \in \mathbb{R}$.

$$X_1, \dots, X_n \mid \theta, \lambda \sim N(\theta, \underline{\lambda}^{-1})$$

$$\theta \sim N(\underline{\mu_0}, \underline{\lambda_0}^{-1})$$

Result: $\theta \mid X_1, \dots, X_n$ $\quad L = \lambda_0^{-1} + n\lambda^{-1}$

$$\sim N(M, L^{-1})$$