November 29, 2007

To students in STA410/2102:

There has been some continuing confusion regarding Question #3 on Homework #4.

So, to clarify:

In this case, the posterior mean of $\mu$ is:

$$\frac{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\int_{0}^{\infty}\int_{0}^{\infty} \mu\ \pi(V,W,\mu,\theta_1,\theta_2)\ dV\, dW\, d\mu\, d\theta_1\, d\theta_2}{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\int_{0}^{\infty}\int_{0}^{\infty} \pi(V,W,\mu,\theta_1,\theta_2)\ dV\, dW\, d\mu\, d\theta_1\, d\theta_2},$$

where $\pi(V,W,\mu,\theta_1,\theta_2)$ is the posterior density for the Variance Components Model as in the file "Rvarcomp", i.e.

$$\pi(V,W,\mu,\theta_1,\theta_2) \ = \ e^{-b_1/V}V^{-a_1-1}e^{-b_2/W}W^{-a_2-1}e^{-(\mu-a_3)^2/2b_3}V^{-K/2}W^{-JK/2} \times$$

$$\times \ \exp\left[-\sum_{i=1}^{K}(\theta_i-\mu)^2/2V - \sum_{i=1}^{K}\sum_{j=1}^{J}(Y_{ij}-\theta_i)^2/2W\right].$$

In this formula, $K$, $J$, $a_i$, $b_i$, and $Y_{ij}$ are all constants, with values specified in the question, but $V, W, \mu, \theta_1, \theta_2$ are five non-constant variables which must be integrated or sampled over.

I hope this clarifies!

– J.R.