PS2, Q1 :

$$\left.\begin{aligned} &A^T N^{-1} A m = A^T N^{-1} d \\ &A = \underset{\substack{\text{orthogonal} \\ \text{rectangular} \\ \text{matrix}}}{Q}\ \underset{\substack{\text{triangular} \\ \text{matrix}}}{R} \end{aligned}\right\} \longrightarrow \begin{aligned} (QR)^T N^{-1} (QR) m &= \\ (QR)^T N^{-1} d \end{aligned}$$

$$R^T Q^T N^{-1} Q R m = R^T Q^T N^{-1} d$$

If we assume $N = I$ $\rightarrow$ $R^T Q^T Q R m = R^T Q^T d$

Sin Q is orthogonal, we have : $Q^T = Q^{-1}$ $\rightarrow$

$$R^T R m = R^T Q^T d$$

$\times\ (R^T)^{-1}$: $Rm = Q^T d \longrightarrow m = R^{-1} Q^T d$

In order to account for the noise matrix, it is easier to rotate it to a new basis. Thus, we will use cholesky decomposition to generate random realizations of our noise matrix and add them to our data.