

Exercise 5: Given

$$\chi^2 = [Y - Ax]^T C^{-1} [Y - Ax]$$

Taking derivative w-r-t x

$$\frac{d}{dx} \chi^2 = -A^T C^{-1} [Y - Ax] - [Y - Ax]^T C^{-1} A$$

or

$$A^T C^{-1} Ax = A^T C^{-1} Y$$

$$\Rightarrow x = [A^T C^{-1} A]^{-1} [A^T C^{-1} Y]$$