

Required Part:

1. Exercise 4.5 (a) (b) on page 201.
2. Exercise 4.13 on pages 203–204.
3. Suppose Y_1, \dots, Y_n is a random sample from $N_p(W\beta, \Sigma)$, where W is a known $p \times k$ matrix of rank k , Σ is a known $p \times p$ matrix of rank p , and β is an unknown $k \times 1$ vector. Find the MLE of β .

Optional Part (no need to hand in):

4. If $Y \sim N_p(\mu, \Sigma)$, then derive the moment generating function of $(Y - \mu)'A(Y - \mu)$ for a symmetric matrix A .
5. Suppose $S \sim W_{n-1}(\cdot | \Sigma)$, $S^{-1} = (s^{ij})_{p \times p}$, $\Sigma^{-1} = (\sigma^{ij})_{p \times p}$. Show that

$$\frac{\sigma^{11}}{s^{11}} \sim \chi^2(n - p)$$