DATA130004: Homework 8

Due in class on December 18, 2019

1. Exercises 9.1, 9.3, 9.4 and 9.7

2. Consider a p-dimensional normal distribution $X = (Y, Z)^\top$ with two partitions $Y \in \mathbb{R}^q, Z \in \mathbb{R}^{p-q}, 0 < q < p$. Correspondingly, the mean of X is $\mu = (\mu_Y, \mu_Z)^\top$ and the covariance of X is
$$\Sigma = \begin{pmatrix} \Sigma_{YY} & \Sigma_{YZ} \\ \Sigma_{ZY} & \Sigma_{ZZ} \end{pmatrix}.$$
Derive the conditional distribution of Z given Y.
Hint: make a non-singular transformation AX where
$$A = \begin{pmatrix} I_q & 0 \\ -\Sigma_{ZY}\Sigma_{YY}^{-1} & I_{p-q} \end{pmatrix}.$$