ST 705 Linear models and variance components

Lab practice problem set 9

March 24, 2021

1. For a random vector Y, with finite second moment, verify the following properties.

   (a) $\mathrm{E}(a'Y) = a'\mathrm{E}(Y)$, for a fixed vector a.

   (b) $\mathrm{Var}(a'Y) = a'\mathrm{Var}(Y)a$, for a fixed vector a.

   (c) $\mathrm{Cov}(a'Y, c'Y) = a'\mathrm{Var}(Y)c$, for fixed vectors a and c.

   (d) $\mathrm{Var}(A'Y) = A'\mathrm{Var}(Y)A$, for a fixed matrix A.

2. In the general linear model, derive an expression for the covariance matrix of a least squares solution, as a function of $\mathrm{Var}(Y)$.