

# ST 705 Linear models and variance components

## Homework problem set 9

April 1, 2025

1. Monahan problem 4.25.
2. Monahan problem 4.27.
3. Monahan problem 5.2.
4. Monahan problem 5.3a-c.
5. Monahan problem 5.6.
6. Monahan problem 5.9.
7. Monahan problem 5.10.
8. For a random vector  $Y$ , with finite second moment, verify the following properties.
  - (a)  $E(a'Y) = a'E(Y)$ , for a fixed vector  $a$ .
  - (b)  $\text{Var}(a'Y) = a'\text{Var}(Y)a$ , for a fixed vector  $a$ .
  - (c)  $\text{Cov}(a'Y, c'Y) = a'\text{Var}(Y)c$ , for fixed vectors  $a$  and  $c$ .
  - (d)  $\text{Var}(A'Y) = A'\text{Var}(Y)A$ , for a fixed matrix  $A$ .