

1. Show that  $ABB' = CBB'$  if and only if  $AB = CB$ , where  $A, B, C$  are matrices.
2. Find the maximum and minimum values of the quadratic form  $4x_1^2 + 4x_2^2 + 6x_1x_2$  for all  $\mathbf{x} = (x_1, x_2)'$  such that  $\mathbf{x}'\mathbf{x} = 1$ .
3. Show that  $\sum_{i=1}^n x_i^2 + \sum_{1 \leq i < j \leq n} x_i x_j$  is a positive definite quadratic form.