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 $\sum_{i=1}^{n} x_i^2 + \sum_{1 \le i < j \le n} x_i x_j$ is a positive definite quadratic form.