## Exercises on positive definite matrices and minima

**Problem 27.1:** (6.5 #33. *Introduction to Linear Algebra:* Strang) When *A* and *B* are symmetric positive definite, *AB* might not even be symmetric, but its eigenvalues are still positive. Start from  $AB\mathbf{x} = \lambda \mathbf{x}$  and take dot products with  $B\mathbf{x}$ . Then prove  $\lambda > 0$ .

**Problem 27.2:** Find the quadratic form associated with the matrix  $\begin{bmatrix} 1 & 5 \\ 7 & 9 \end{bmatrix}$ . Is this function f(x, y) always positive, always negative, or sometimes positive and sometimes negative?

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