## 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, $A B$ might not even be symmetric, but its eigenvalues are still positive. Start from $A B \mathbf{x}=\lambda \mathbf{x}$ and take dot products with $B \mathbf{x}$. Then prove $\lambda>0$.

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

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