1135-05-603 **John R Greene*** (`jgreene@d.umn.edu`), Department of Mathematics and Statistics, University of Minnesota Duluth, 1117 University Drive, Duluth, MN 55812. *Combinatorial properties of traces of matrix products.*

It might come as a surprise that there are no 2×2 real matrices A and B for which $\mathrm{Tr}(A^2B^4) < \mathrm{Tr}(AB^2AB^2) < \mathrm{Tr}(ABAB^3)$. More generally, suppose $x_1 = \mathrm{Tr}(A^2B^{2n-2})$, $x_2 = \mathrm{Tr}(ABAB^{2n-3})$, $\ldots$, $x_n = \mathrm{Tr}(AB^{n-1}AB^{n-1})$. If σ is a permutation of n we may ask if there are matrices A and B for which $x_{\sigma(1)} < x_{\sigma(2)} < \cdots < x_{\sigma(n)}$. It turns out that for most permutations (when n is large), the answer is no. Call a permutation **trace order consistent** if 2×2 matrices A and B exist for which $x_{\sigma(1)} < x_{\sigma(2)} < \cdots < x_{\sigma(n)}$. Using elementary properties of the zeros of Chebyshev polynomials of the second kind, an exact count is given for the number of trace order consistent permutations. (Received September 10, 2017)