Problem 6 (due Monday, April 27)

Let $M$ be an $m \times n$ matrix whose entries are positive real numbers. For each column of $M$ compute the product of all the numbers in that column. Let $S(M)$ be the sum of all these products. Now let $N$ be the matrix obtained form $M$ by putting entries in each row in a non-decreasing order. Prove that $S(N) \geq S(M)$.

Overview

Every other Monday (starting 02/03/20), we will post a problem to encourage students (both undergraduate and graduate) to enjoy mathematics outside of the classroom and engage our mathematical community in the problem solving activity. If you have a solution and want to be a part of it, e-mail your solution to Marcin Mazur (mazur@math.binghamton.edu) by the due date. We will post solutions (from us) as well as novel solutions from participants and record the names of those who've got the most number of solutions throughout each semester.

When you submit your solutions, please provide a detailed reasoning rather than just an answer. Also, please include some short info about yourself for our records.

Previous Problems

- **Problem5** Solution received from Yuqiao Huang, Ashton Keith, and Naftoli Kolodny.
- **Problem4** Solved by only one participant: Ashton Keith, a freshman majoring in math.
- **Problem3** Solved completely only by Ashton Keith, a freshman majoring in math. A solution with some details missing was also submitted by Yuqiao Huang.
- **Problem2** Solved by only one participant: Yuqiao Huang - a freshman and a math-major.
- **Problem1** Solved by only one participant: Yuqiao Huang - a freshman and a math-major.