MATH 184A: PROBLEM SET 3

DUE AT 16:00 ON FRIDAY, FEBRUARY 2

(1) For each positive integer n, prove that there exists a $2^n \times 2^n$ Hadamard matrix.

(2) Show that, for any positive integer n, and any numbers $a_1, \ldots, a_n$, we have

$$\min\{a_1, \ldots, a_n\} \leq \frac{a_1 + \cdots + a_n}{n} \leq \max\{a_1, \ldots, a_n\}.$$

(3) For each positive integer n, prove that there exists an $n \times n$ matrix A with ± 1 entries such that $|\det A| \geq \sqrt{n!}$.