1077-05-2438 **Keivan Hassani Monfared*** (k1monfared@gmail.com), 1103 E CANBY ST., Laramie, WY 82072. *On the Permanent Rank of Matrices.*

The permanent of the $n \times n$ matrix $A = \left[a_{ij}\right]$ is defined to be the sum of all diagonal products of A, that is:

$$\text{per}(A) = \sum_{\sigma \in S_n} \prod_{i=1}^{n} a_{i\sigma(i)},$$

where S_n is the symmetric group of order n.

The term rank of A, denoted termrank(A), is the largest number of nonzero entries of A with no two in the same row or column. The permanent rank of a matrix A, denoted by perrank(A), is defined to be the size of a largest square sub-matrix of A with nonzero permanent.

Here we study the following conjecture relating the perrank and the termrank:

Conjecture: For any matrix A,

$$\text{perrank}(A) \geq \left\lceil \frac{\text{termrank}(A)}{2} \right\rceil,$$

and for even termrank the equality holds if and only if $A = \bigoplus \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$, up to permutation and scaling of rows and columns of A, and omitting zero rows and columns.

(Received September 22, 2011)