1035-15-1358 **Yongzhi Yang**, **Luke D Edholm*** (`ldedholm@stthomas.edu`) and **Jason Q McClintic**. *Use of Leibniz Matrices to Compute Determinants of Matrices With Generated Entries.* Preliminary report.

Matrices with binomial coefficients arise in many contexts. Demetriou and Lipitakis (2001) cite numerous examples in which such matrices arise.

The problem is not new. In their 1999 paper, Ratliff and Rush derive the following formula for $s \times s$ matrices $M(n, s; r_1, r_2, \ldots, r_n)$ which are formed by removing columns $r_1, r_2, \ldots, r_n$ from the $s \times m$ matrix $A(n, s)$ $(m = s + n)$ formed as follows. The first row is $-\binom{n}{0}, \binom{n}{1} - \binom{n}{2}, \cdots (-1)^{n+1}, \binom{n}{n}$ followed by $s - 1$ zeros and whose subsequent rows have $i - 1$ leading zeros (where i is the row number) followed by the first row with the last $i - 1$ entries deleted:

$$\det\left(M(n, s; r_1, \ldots, r_n)\right) = (-1)^{ns + \frac{n(n+1)}{2} + r_1 + \cdots + r_n} \prod_{1 \le i < j \le n} \frac{r_j - r_i}{j - i}$$

This is a special case of using when Leibniz matrices can be used to construct a matrix whose determinant is equal up to a sign equal to that of the matrix of interest, but may be easier to compute. Two generalizations are obtained by using generating functions corresponding to $f(t) = (1 - t)^{\alpha}$ for real number α and $f(t) = \frac{1}{1 - rt - t^2}$. (Received September 19, 2007)