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Karsten K. Schmidt* (kschmidt@fh-sm.de). *The Moore-Penrose inverse of a vector: Coping with a sometimes tricky case differentiation.*

The Moore-Penrose inverse (MPI) of an n by 1 (column) vector b is a 1 by n (row) vector. Its computation is a rather simple task, even though a case differentiation has to be made: If b is a zero vector, the MPI of b is the transpose of b (i.e. the 1 by n zero vector), otherwise it is the transpose of b divided by the inner product of b with itself (i.e. $b'/(b'b)$). If b only has numeric elements, it is easy to find out which case is on hand. If b contains at least one non-numeric element, the computation of its MPI might be as simple as before, but it might also turn out to be impossible to decide which case we have. This is made clear by some examples, using the Computer Algebra System Derive. We will then proceed to the computation of the MPI of a matrix containing at least one non-numeric element. For the actual computation of the MPI of such a matrix, we use a Derive function based on Greville's method - an iterative algorithm that needs n steps for the computation of the MPI of an m by n matrix. As Greville's method requires the computation of the MPI of a vector in each step, the difficulty mentioned above might prevent the actual computation of the MPI of a matrix with non-numeric elements. (Received September 05, 2008)