Matrices with Dominant Staircases

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We consider the problem of finding row and column permutations of a given real matrix, such that the resulting permuted matrix displays a subset of *dominant* entries in a *staircase* pattern. An entry is called dominant if it is the maximum of all entries which are neither to the left nor above it; a staircase can be viewed as a generalisation of a (sub-)diagonal. Although, in general, this problem could have no solution, we provide polynomial time algorithms for special cases. Applications are discussed, like the *bottleneck assignment* problem, in the realm of combinatorial optimization, and the *majority method*, a well-known choice function for voting systems.