A POWERFUL DETERMINANT

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ABSTRACT. We study the construction of auxiliary functions likely to aid in obtaining improved irrationality measures for cubic irrationalities and thence for arbitrary algebraic numbers. Specifically, we note that the construction of curves with singularities appropriately prescribed for our purpose leads to a simultaneous Padé approximation problem. The first step towards an explicit construction appears to be the evaluation of certain determinants. Our main task here is the computation of an example determinant, which turns out indeed to be a product of a small number of factors each to high multiplicity—whence the adjective 'powerful'. Our evaluation confirms a computational conjecture of Bombieri, Hunt and van der Poorten.