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Some integer formula-encodings and related algorithms

abstract We investigate the special class of formulas made up of arbitrary but finite combinations of addition, multiplication, and exponentiation gates. The inputs to these formulas are restricted to the integral unit 1. In connection with such formulas, we describe two essentially distinct families of canonical formula-encodings for integers, respectively deduced from the decimal encoding and the fundamental theorem of arithmetic. Our main contribution is the detailed description of two algorithms which efficiently determine the canonical formula-encodings associated with relatively large sets of consecutive integers.