

**Borwein, J. M.; Borwein, P. B.**

**The arithmetic-geometric mean and fast computation of elementary functions.** (English)

Zbl 0557.65009

SIAM Rev. 26, 351-366 (1984).

Computational methods based on the arithmetic-geometric mean are discussed and used for constructing devices for rapidly computing elementary functions. An algorithm for  $\pi$  is given that exponentially converges: 20 iterations will provide over two million digits. All the examples rely on material from the theory of elliptic functions, and which essentially goes back to Gauss. The paper is an interesting synthesis of classical mathematics with contemporary computational concerns. The treatment is entirely self-contained and uses a minimum of elliptic function theory.

Reviewer: [N.M.Temme](#)

**MSC:**

[65D20](#) Computation of special functions and constants, construction of tables  
[01A50](#) History of mathematics in the 18th century  
[65-03](#) History of numerical analysis  
[33-03](#) History of special functions  
[33E05](#) Elliptic functions and integrals  
[26A09](#) Elementary functions

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**Keywords:**

[elliptic functions](#); [exponential convergence](#); [arithmetic-geometric mean](#); [elementary functions](#)

**Full Text:** [DOI](#)