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NUMERICAL EVALUATION OF SPECIAL FUNCTIONS

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ABSTRACT. This document is an excerpt from the current hypertext version of an article that appeared in Walter Gautschi (ed.), *Mathematics of Computation 1943–1993: A Half-Century of Computational Mathematics*, Proceedings of Symposia in Applied Mathematics 48, American Mathematical Society, Providence, RI 02940, 1994. The symposium was held at the University of British Columbia August 9–13, 1993, in honor of the fiftieth anniversary of the journal *Mathematics of Computation*.

The original abstract follows.

Higher transcendental functions continue to play varied and important roles in investigations by engineers, mathematicians, scientists and statisticians. The purpose of this paper is to assist in locating useful approximations and software for the numerical generation of these functions, and to offer some suggestions for future developments in this field.

4. Functions of One Variable

In the references that follow an indication is made of the programming language where applicable. Also, special note is made of references that include surveys. Libraries and interactive systems are listed separately.

In the subsections of §4 and §5, a library or interactive system is listed only if it employs an algorithm tailored to the restrictions of the subsection. For example, NAG is listed in §4.1.1 and §4.1.2 because it has separate capabilities for Airy functions of real and complex argument. Maple is listed only in §4.1.1 because it does not have Airy functions of complex argument. Mathematica is listed only in §4.1.2 because it does not use a restricted algorithm for real arguments. Because these distinctions are sometimes difficult to infer from software documentation and even, when available, from source code, they should be regarded only as a guide, both in §4 and §5.

4.1. Airy Functions. [6]

4.2. Error Functions, Dawson's Integral, Fresnel Integrals. [7]

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[1] /nesf/Sect0/Sect0.html
[2] /nesf/Sect3-4/Sect3-4.html
[3] /nesf/Sect4-1/Sect4-1.html
[4] ftp://gams.nist.gov/pub/lozier/nesf/Paper.ps.Z
[5] ftp://gams.nist.gov/pub/lozier/nesf/Sect4.ps.Z

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[6] /nesf/Sect4-1/Sect4-1.html
[7] /nesf/Sect4-2/Sect4-2.html

4.3. Exponential Integrals, Logarithmic Integral, Sine and Cosine Integrals. [8]
4.4. Gamma, Psi, and Polygamma Functions. [9]
4.5. Landau Density and Distribution Functions. [10]
4.6. Polylogarithms. [11]
4.7. Zeta Function. [12]

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[8] /nesf/Sect4-3/Sect4-3.html
[9] /nesf/Sect4-4/Sect4-4.html
[10] /nesf/Sect4-5/Sect4-5.html
[11] /nesf/Sect4-6/Sect4-6.html
[12] /nesf/Sect4-7/Sect4-7.html