Errors in ANSI/IEEE Std 854-1987
"IEEE Std for Radix-Independent Floating Pt. Arithmetic" SH11460
Pg 8, LH column, line # 27-28 "numbers of the form $(-1)^s b^E (d_0 . d_1 d_2 \cdots d_{p-1})$"
↗ missing radix point

Handouts for Floating-Point Lectures

David Hough

Pg 16, LH column, last 2 lines
"for x ~~positive~~ non-zero and finite 1 ← abs(scalb(x....

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. SYLLABUS

1.1. Computer System Support for Scientific and Engineering Computation, 11 April, 6 pp.

1.2. Examples of Plausible Projects, 5 May, 2 pp.

1.3. Registration list, Hough, 23 May, 2 pp.

2. FORMAL LECTURE NOTES

2.1. Lecture 1 - May 3, Ma, 11 May, 8 pp.

2.2. Lecture 2 - May 5, Freedman and Ma, 23 May, 20 pp.

2.3. Lecture 3 - May 10, Wilkie and Ma, 23 May, 8 pp.

2.4. Lecture 4 - May 12, Ma, 18 May, 9 pp.

3. COPIES OF OVERHEAD TRANSPARENCIES

3.1. 3 and 5 May - Five Frightening Facts, 6 pp.

3.2. 10 May - Radix or Base, 19 pp. Lecture 3 slides

3.3. 12 May - Pending Assignments, 5 pp.

3.4. 17 May - Conventional Floating-Point Formats, 13 pp. Lecture 5 slides

3.5. 19 May - The Classical model of Roundoff, 7 pp.

4. UNPUBLISHED RESEARCH AND CLASS NOTES

4.1. Machine-independent Algorithms for floor and ceil, 3 May, 5 pp.

4.2. Accurate Singular Values and Vectors of an Upper Triangular 2-by-2 Matrix, with Demmel, 27 April, 6 pp.

4.3. Roundoff in Polynomial Evaluation, 18 October 1986, 6 pp.

5. Other handouts

5.1. Comments on Floating-point Indoctrination Syllabus, Thacher, 18 April, 3 pp.

5.2. A Proposed Radix- and Word-length-independent Standard for Floating-point Arithmetic, Cody et. al., IEEE Micro, August 1984, 16 pp., CCC 170 copies.

5.3. Letter from Prof. Kulisch, 10 May, 4 pp.

Handouts for Floating-Point Lectures - Set 2

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. FORMAL LECTURE NOTES

1.1. Page 3 of Lecture 3 - May 10, Wilkie and Ma, 23 May, 1 pp.

2. COPIES OF OVERHEAD TRANSPARENCIES

2.1. 24 May - How Often at Best can SQRT(x*x) = ABS(x) ?, 12 pp.

2.2. 26 May - By How Much Must q Exceed p to Guarantee, 8 pp.

3. UNPUBLISHED RESEARCH AND CLASS NOTES

3.1. Calculating Area and Angle of a Needle-like Triangle, 23 September 1986, 3 pp.

3.2. Frexp/ldexp vs. Logb/scalb, 23 May, 6 pp.

4. OTHER HANDOUTS

4.1. Implementation of Algorithms Part I, 1973, approx. 200 pp.

Handouts for Floating-Point Lectures - Set 3

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. OTHER HANDOUTS

1.1. Tentative Schedule, 30 May, 1 p.

1.2. The Error-Analyst's Quandary, 1972, 5 pp.

1.3. Interval Arithmetic Options in the Proposed IEEE Floating-Point Arithmetic Standard, 1980, 16 pp.

1.4. FORTRAN-SC, Bleher, Rump, Kulisch, Metzger, Ullrich, Walter, 1987, 18 pp.

1.5. The Arithmetic of the Digital Computer, Kulisch and Miranker, 1986, 40 pp.

Handouts for Floating-Point Lectures - Set 4

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. ADMINISTRIVIA

1.1. Video replays, Sazegari, 2 June, 2 pp.

2. FORMAL LECTURE NOTES

2.1. Lecture 7A - 24 May, Goldberg, 31 May, 4 pp.

3. COPIES OF OVERHEAD TRANSPARENCIES

3.1. Comparison of Multi-word Integer Add/Subtract, 27 May, 19 pp.

4. UNPUBLISHED RESEARCH AND CLASS NOTES

4.1. A More Complete Interval Arithmetic, 1968, 48 pp.

4.2. Can You Count on your Calculator?, with Parlett, 1977, 30 pp.

4.3. The Last Example on Gradual Underflow, Hough, 1980, 1 p.

4.4. On Alleged Mathematical Optimality, 1986, 6 pp.

4.5. Multi-Step Gradual Rounding, Corinna Lee, 10 pp.

5. REPRINTS OF PUBLISHED MATERIAL

5.1. A Survey of Error Analysis, 1971, 26 pp.

5.2. Applications of the Proposed IEEE 754 Standard, Hough, 1981, 5 pp.; CCC 100 copies.

5.3. Mathematics Written in Sand, 1983, 15 pp.

5.4. Anomalies in the IBM ACRITH Package, 1985, 10 pp.; CCC 170 copies.

Toy,
Bonnie

Handouts for Floating-Point Lectures - Set 5

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. ERRATA

1.1. Set 2: page 9-3 from Implementation of Algorithms Part I, missing from some copies.

1.2. Set 4: corrections to Anomalies in the IBM ACRITH PACKAGE.

2. FORMAL LECTURE NOTES

2.1. Lecture 7B - 24 May, Ng, 10 June, 10 pp.

3. COPIES OF OVERHEAD TRANSPARENCIES

3.1. Lecture 11 - 7 June, Kulisch, 23 pp.

4. UNPUBLISHED RESEARCH AND CLASS NOTES

4.1. 7094-II System Support for Numerical Analysis, 1966, 52 pp.

4.2. Literature on Scientific Computation, Kulisch, 2 June, 4 pp.

4.3. An Experiment with ACRITH, with Tang, 9 June, 6 pp.

4.4. Transcendental Functions using Cordic, Valerio, preprint 10 June, 7 pp.

5. REPRINTS OF PUBLISHED WORK

5.1. How Reliable are Results of Computers?, Rump, 1983, 4 pp.

5.2. Arithmetic for Vector Processors, Kirchner and Kulisch, 1987, 14 pp.; CCC CH2419-0/87/0000/0256$01.00

5.3. Fortran - SC, Kulisch, 17 pp.

6. OTHER HANDOUTS

6.1. GAMM Resolution on Computer Arithmetic, Kulisch, 1 pp.

6.2. Teubner Book Announcements, Kulisch, 3 pp.

6.3. Announcement for International Symposium on Computer Arithmetic and Self-Validating Numerical Methods, Ullrich, 1 pp.

Handouts for Floating-Point Lectures - Set 6

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. ADMINISTRATION

1.1. Class schedule, 14 June, 1 p.

2. OVERHEAD TRANSPARENCIES

2.1. Transcendental Approximations using Cordic, Valerio, 14 June, 27 pp.

2.2. The Cydra 5, Anderson, 21 June, 35 pp.

3. UNPUBLISHED RESEARCH AND CLASS NOTES

3.1. Gaussian Elimination with Extra-Precise Accumulation of Products, 1983, 18 pp.

3.2. Handling Arithmetic Exceptions, May 1987, 16 pp.

3.3. Compiler support for floating-point computation, Farnum, August 1987, 13 pp.

3.4. Transcendental Approximations Using Cordic, Valerio, 14 June, 14 pp.

3.5. Some Observations about the 80960 Floating-Point Architecture, Valerio, 14 June, 7 pp.

4. REPRINTS OF PUBLICATIONS

4.1. Numerical Linear Algebra, 1966, 25 pp.

4.2. The Probability that a Numerical Analysis Problem is Difficult (extracts), Demmel, April, 14 pp.

4.3. Compiler Support for Floating-point Computation, Farnum, April, 9 pp.

5. MISCELLANY

5.1. Some current publication abstracts, Hough, 7 pp.

5.2. The Minisupercomputer, Vollaro, 4 pp.

5.3. Cydra 5 Directed Dataflow Architecture, Anderson, 21 June, 13 pp.

5.4. Cydra 5 Performance Briefs, Anderson, 21 June, 18 pp.

Handouts for Floating-Point Lectures - Set 7

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

Handouts for Floating-Point Lectures - Set 8

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. FORMAL LECTURE NOTES

1.1. Guest Lecture 13 by Valerio - 14 June, Goldberg, 6 July, 18 pp.

1.2. Lecture 14 - 16 June, Goldberg, 6 July, 4 pp.

1.3. Guest Lecture 15 by Anderson - 21 June, Goldberg, 6 July, 2 pp.

2. OVERHEAD TRANSPARENCIES

2.1. Z := x+y in D.P., 7 July, 6 pp.

3. UNPUBLISHED RESEARCH AND CLASS NOTES

3.1. On Alleged Mathematical Optimality, 8 January 1986, 3 pp.

3.2. SQRT [in software], with Ng, 6 May 1986, 11 pp.

3.3. Rational Arithmetic in Floating Point, 20 September 1986, 9 pp.

3.4. Calculating Area and Angle of a Needle-Like Triangle, 23 September 1986, 3 pp.

3.5. A Distillation Program, 7 February 1987, 1 p.

3.6. Frexp/ldexp vs. logb/scalb, 23 May 1988, 7 pp.

4. REPRINTS OF PUBLICATIONS

4.1. The Near Orthogoality of Syntax, Semantics, and Diagnostics, with Coonen, 1982, 6 pp.

4.2. Excerpts from HP-15C Advanced Functions Handbook, 1982, 32 pp.

4.3. Excerpts from System V Interface Definition, AT&T, 1986, 17 pp.

5. MISCELLANY

5.1. SunOS 4.0 3M man pages, 1988, 26 pp.

5.2. SunOS 4.0 (3) man pages relating to floating point, 1988, 21 pp.

5.3. Fortran 1.1 (8) man pages relating to floating point, 1988, 8 pp.

5.4. SunOS 4.0 /usr/include files relating to floating point, 1988, 15 pp.

Handouts for Floating-Point Lectures - Set 9

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

Handouts for Floating-Point Lectures - Set 10

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

Handouts for Floating-Point Lectures - Set 11

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. UNPUBLISHED RESEARCH AND CLASS NOTES

1.1. Language Specifications for SANE Pascal Numerics, J W Thomas, 1985, 11 pp.

1.2. Elementary Inequalities among Elementary Functions, 1985, 3 pp.

1.3. Elementary Functions from Kernels, 1985, 3 pp.

1.4. Apple Numerics Manual, Second Edition (excerpts), 18 pp.

1.5. Additional Floating-Point Indoctrination Exercises, Hough, 21 July, 6 pp.

2. REPRINTS OF PUBLICATIONS

2.1. New Developments in PASCAL-SC (abstract), Bohlender, Ullrich, von Gudenberg, SIGPLAN August 1988, 1 p.

Handouts for Floating-Point Lectures - Set 12

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

1. OVERHEAD TRANSPARENCIES

1.1. SANE Standard Apple Numerics Environment, Clayton Lewis, 14 July, 8 pp.

1.2. Floating-Point Arithmetic Exceptions, 26 July, 13 pp.

2. UNPUBLISHED RESEARCH AND CLASS NOTES

2.1. Larry Breed's Experiment, 25 July, 1 pp.

3. REPRINTS OF PUBLICATIONS

3.1. Micro-Analysis of the Titan's Operation Pipe (abstract), Sanguinetti, June, 1 p.

4. MISCELLANY

4.1. Letter and announcement on Scientific Computation with Automatic Result Verification, Kulisch, 12 July, 3 pp.

4.2. Rationally biased rounding can be beneficial, Matula and Kornerup, 22 July, 2pp.

Handouts for Floating-Point Lectures - Set 13

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

There will be one more handout set distributed later containing formal notes for the remaining lectures. Note that there will be no formal notes for lecture #11 by Prof. Kulisch since it closely followed his published papers which were previously distributed.

Completed video sets: persons who ordered completed video sets from the video contractor should note the following:

1) Lectures #1 and #7 are not included since they were already distributed as samples.
2) The master video tape of the second hour of lecture #24 was lost. Copies of this lecture contain only audio on the second hour.

5.6. Specifications for Exponentiation, 27 July, 1 p.

5.7. Jean-Michel Muller's Example, 28 July, 1 p.

5.8. Note's on Kahan's A Distillation Program, Yuval, 26 August, 1 p.

6. REPRINTS OF PUBLICATIONS

6.1. Rationally Biased Arithmetic, Ferguson and Matula, 1985, 9 pp.

6.2. Finite Precision Lexicographic Continued Fraction Number Systems, Kornerup and Matula, 8 pp.

6.3. Review of Numerical Recipes, Isaacson, 1 p.

6.4. Review of Numerical Recipes, Shampine, 4 p.

6.5. Some publication abstracts, Hough, 11 pp.

7. MISCELLANY

7.1. The Minisupercomputer, Vollaro, 4 pp.

7.2. Cydra 5 Directed Dataflow Architecture, Anderson, 21 June, 13 pp.

7.3. Cydra 5 Performance Briefs, Anderson, 21 June, 18 pp.

7.4. Comments on Proposed ANSI C Standard (Jan 88 draft) with X3J11 responses, Hough, 15 August, 39 pp.

7.5. Excerpts from Proposed ANSI C Standard (May 88 draft) and Rationale, 13 May, 44 pp.

7.6. Comments on Proposed ANSI C Standard (May 88 draft), Hough, 29 August, 15 pp.

Handouts for Floating-Point Lectures - Set 14

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures; except as noted, by W. Kahan, 1988.

The following consist of unedited lecture notes and unpublished research notes. Any remaining shortcomings are the responsibility of the student to detect and rectify, of course.

Handouts for Floating-Point Lectures - Set 15

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures.

1. MISCELLANY

1.1. Underflow can Hurt - Grosse and Moler, 1 p.

1.2. Products incorporating ACRITH - Kulisch, 31 October 1988, 2 pp.

1.3. 10% Discount Coupon for Patterson/Hennessy book with 62-page computer arithmetic appendix by Goldberg - 1990, 2 pp.

1.4. Elementary Functions based upon IEEE Arithmetic - Hough, November 1983, 4pp.

1.5. Proposed Floating Point Environmental Inquiries in Fortran - Kahan, Demmel, Coonen, 7 pp.

1.6. Compatible Hardware for Division and Square Root - Taylor, May 81, 8 pp.

1.7. A Portable Floating-Point Environment - Barnett, 18 Dec 87, 20 pp.

1.8. Precision Improvement of Software Algorithms - Lieutier, Alemi, 1988, 21 pp.

1.9. What Every Computer Scientist Should Know About Floating-Point Arithmetic - Goldberg, 13 Jun 90, 53 pp.

Handouts for Floating-Point Lectures - Set 16

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures.

Note: DO NOT USE the Morgan Kaufmann discount form in lecture notes set 15 - a revised one will be distributed later.

1. MISCELLANY

1.1. Mailing address verification letter sent to all non-Sun attendees - 3 December 1990, Hough, 1 p.

1.2. Handouts for Floating-Point Lectures - 1990 Cumulative. 10 December 1990, Hough, 3 pp.

1.3. SPARC V8 Appendix N: SPARC IEEE 754 Implementation Recommendations - July 1990, Hough, 5 pp.

1.4. Floating-Point Computation - 1974, Sterbenz, reprinted by permission of Prentice Hall, 165 pp.

Handouts for Floating-Point Lectures - Set 17

David Hough

Handouts for Sun Microsystems Floating-Point Indoctrination lectures.

Note: DO NOT USE the Morgan Kaufmann discount form in lecture notes set 15 - a revised one will be distributed later.

1. MISCELLANY

1.1. Floating-Point Computation - 1974, Sterbenz, reprinted by permission of Prentice Hall, pages 136-227, inadvertently omitted from set 16 during reproduction.