

A Bibliography of Publications on Floating-Point Arithmetic

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Introduction

This is a bibliography of material on floating-point arithmetic that I came up with while doing research on a floating-point package of my own. I don't claim it to be anywhere near complete. The material listed is only what I myself possess.

My main interest was in software based, binary floating-point arithmetic on a microprocessor, so you won't find much material about the hardware used in floating-point arithmetic (e.g. adders, carry propagation schemes, higher radix representation for multiplication and division, etc.) in this list. There is also not too much on non-binary floating-point arithmetic.

For most fields covered in this bibliography, the important or historically relevant articles should be included. There is also some material on integer arithmetic in this list as some of the methods used with integer arithmetic contain interesting ideas that may be useful in the realization of a floating-point arithmetic package.

Also, depending on the type of microprocessor used, one may need to implement integer multiplication and division for use in the floating-point package, so articles about this topic are included as well.

As I am German, there is a bit of material in German in this bibliography. However, English translations are provided for all non-English titles.

Thanks to the people who have helped me with previous versions of this document by sending me papers or additional references:

- Steven Sommars (sesv@research.bell-labs.com),
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- Nhuan Doduc (ndoduc@framentec.fr),
- K. C. Ng (kwok.ng@eng.sun.com),
- Nelson H. F. Beebe (beebe@math.utah.edu).

Bibliography entries in the **Books** section are ordered alphabetically by author; ordering is by ascending year in the remaining sections.

Warning: it has yet not been possible to bring this citation list up-to-date with the entries in the BIBTE

Books, hardware oriented

[1734, 282, 1293, 1220, 3135, 3342, 1930, 843, 1167, 1002, 1466, 845, 1351, 7413, 7414, 1569]

Books, software oriented or theory

[1280, 468, 471, 472, 119, 1428, 2415, 910, 1052, 353, 2976, 2456, 2993, 2291, 321, 529, 7267]

Books, machine specific

[2194, 3242, 3137, 2458, 1780, 1916, 2310, 1949, 2493]

Journal Publications, Conference Papers, Technical Reports, Ph.D. Dissertations, Book Contributions, etc.

1 Choice of base, floating point formats

[500, 752, 754, 732, 729, 895, 1144, 1134, 2051, 2288, 2413, 2566, 2794, 2808]

1.1 Precision and Rounding

[434, 560, 747, 849, 883, 898, 966, 1034, 1044, 1048, 1198, 1303, 1444, 1384, 1550, 1742, 2301, 2478, 2551, 2865, 3183, 3307]

1.2 Determination of parameters of floating point arithmetic

[688, 825, 1648, 2294, 2220]

1.3 IEEE standards for floating point arithmetic

[995, 1201, 1227, 1210, 1238, 1200, 1207, 1348, 1334, 1335, 1287, 1307, 1468, 1393, 1417, 1395, 1738, 1837, 1875, 1876, 1873, 2103, 2190, 2361, 2595, 3077]

1.4 Floating point arithmetic, general and implementation issues

[635, 721, 1016, 1037, 1086, 1098, 1097, 1240, 1242, 1214, 1281, 1272, 1485, 1503, 2006, 2026, 2236, 2237, 2394, 2468, 2371, 2550, 2795, 2796, 2724, 2793, 3035]

1.5 Floating point packages

[1294, 1713, 1691, 1786, 1744, 1897, 1862, 1898, 1981, 2096, 2119, 2223, 2320, 2321, 2322, 2501, 2502, 1360]

1.6 Floating point units

[417, 1156, 1328, 1285, 1338, 1362, 1331, 1357, 1277, 1323, 1332, 1508, 1552, 1507, 1545, 1568, 1674, 1588, 1590, 1591, 1692, 1622, 1619, 1627, 1654, 1729, 1630, 1802, 1789, 1729, 1770, 1799, 1731, 1810, 2022, 1984, 2012, 1978, 2031, 1970, 1963, 1964, 2146, 2098, 2171, 2266, 2295, 2329, 2271, 2297, 2272, 2203, 2232, 2342, 2283, 2233, 2308, 2483, 2429, 2430, 2454, 2344, 2465, 2427, 2424, 2336, 2446, 2485, 2385, 2345, 2466, 2350, 2586, 2521, 2541, 2581, 2536, 2513, 2584, 2567, 2558, 2682, 2791, 2754, 2981, 2894, 2964, 3121, 3071, 3213, 3374]

1.7 Test of floating point routines

[502, 1463, 1739, 1883, 1882, 2034, 2035, 1979, 2123, 2491, 2619, 2627, 2696, 2695, 2811, 2790, 2776, 3076]

2 Addition and Subtraction

[376, 1523]

2.1 Floating-point Summation

[326, 346, 363, 362, 572, 641, 679, 833, 1673, 2296, 2374]

2.2 Multiplication

[682, 1251, 1265, 1486, 1555, 1526, 1586, 1613, 1605, 1631, 1688, 1603, 1771]

2.3 Division

[209, 238, 223, 323, 349, 439, 1019, 1067, 1319, 1411, 1579, 1657, 1635, 1618, 1783, 1903, 2029, 2008, 2409, 2800, 2745, 2991, 3040, 7435, 2973]

3 Elementary functions, general

[385, 399, 588, 652, 617, 1125, 1271, 1639, 1668, 1769, 1732, 1730, 1807, 1853, 7354, 1959, 2067, 2172, 2115, 2298, 7373, 2582, 2619, 2569, 3361, 2571, 2540, 2720, 2873, 2684, 2835, 2836, 2713, 3394, 3362]

3.1 Elementary functions, CORDIC and related algorithms

[190, 191, 248, 264, 374, 525, 553, 661, 653, 669, 735, 857, 1071, 1087, 1300, 1460, 1712, 1910, 1721, 1824, 1977, 2177, 2403, 2332, 2563, 2589, 2739, 2833, 3034, 3029, 3153, 3092, 3138]

3.2 Elementary functions, function approximation

[240, 241, 483, 625, 770, 769, 985, 1023, 1165, 2014, 2068, 2632, 2708, 2806, 2807]

3.2.1 Polynomial evaluation

[259, 280, 305, 427, 1064, 1232, 2373]

3.3 Square root, general

[1085, 1191, 1491, 1610, 1663, 2587, 2700]

3.3.1 Square root, bit-oriented, iterative, and table methods of computation

[120, 153, 360, 1024, 1010, 1154, 1361, 1453, 1414, 1380, 1435, 1549, 1838, 1936, 1847, 1900, 1985, 1966, 2049, 1969, 2020, 2062, 2105, 2157, 2198, 2274, 2412, 2599, 2556, 2732, 3062]

3.3.2 Square root, Newton's method

[158, 281, 303, 375, 348, 344, 384, 452, 428, 515, 520, 534, 598, 587, 581, 583, 704, 1336, 1325, 1405, 1595, 2355, 3042, 2971]

3.4 Sine and Cosine

[180, 1071, 1020, 1025, 1180, 1406, 1556, 1678, 1677, 1778, 1866, 1967, 2138, 2250, 2628, 2985, 2982, 2904, 3004, 3098]

3.5 Logarithm

[154, 271, 332, 692, 1000, 1115, 1306, 1539, 2124, 2125, 2629, 2758]

3.6 Exponential function

[141, 410, 1187, 1369, 1528, 1761, 1860, 2492, 2630, 3026]

3.7 Arctangent

[143, 160, 207]

3.8 Other transcendental functions

[501, 615, 161, 1026, 366, 276, 361, 2117, 1160, 2883, 3078]

4 Binary-decimal conversion

[189, 173, 222, 477, 578, 686, 1168, 1298, 1299, 1413, 1666, 1722, 2016, 1989, 2531, 2623, 2547, 2879]

5 BCD arithmetic

[676, 728, 779, 780, 781, 782, 783, 784, 785, 1390, 1502, 1718, 1652, 2052, 2668, 2984]

6 Multiple precision arithmetic

[293, 331, 411, 429, 634, 618, 955, 1004, 1102, 1101, 1271, 1358, 1439, 1554, 2828, 2812, 3057, 3249]

7 Conferences on computer arithmetic

[7293, 7303, 7308, 7317, 7320, 7333, 7351, 7352, 7394, 7424, 7432, 7426, 7458]

8 Additional contributions from Nelson H. F. Beebe

[121, 136, 169, 215, 298, 347, 368, 450, 754, 557, 850, 879, 923, 924, 976, 990, 1004, 1009, 1073, 1075, 1102, 1101, 1196, 1166, 1225, 1250, 1270, 1278, 1295, 1396, 1434, 1439, 1469, 1470, 7333, 1727, 1737, 1740, 1754, 1760, 1868, 1874, 1908, 1937, 1993, 2036, 2047, 2077, 2120, 2134, 2142, 2187, 2296, 2297, 2351, 2508, 7406, 2553, 2557, 2570, 2577, 2586, 2627, 2639, 7432, 2763, 2764, 2788, 2792, 2809, 2828, 2881, 2882, 2996, 3076, 3294, 208, 215, 216, 252, 283, 295, 307, 308, 312, 343, 363, 422, 441, 475, 494, 528, 572, 594, 618, 641, 712, 796, 829, 831, 847, 866], [899, 901, 906, 928, 949, 975, 977, 984, 986, 1018, 1066, 1074, 1257, 1290, 1365, 1439, 1446, 1471, 1474, 1571, 1576, 1636, 1650, 1659, 1660, 1716, 1757, 1797, 1801, 1820, 1821, 1826, 1828, 1845, 1856, 1857, 1950, 1982, 2027, 2038, 2114, 2159, 2188, 2205, 2270, 2285, 2300, 2323, 2382, 2393, 2397, 2479, 2503, 2509, 2554, 2601, 2615, 2678, 2689, 2725, 2769, 2820, 2884, 2952, 2958, 2992, 3018, 3026, 3061, 3114, 3122, 3201, 3215, 3218, 3262, 3305, 3352, 7264, 7301, 7309, 7318, 7319, 7344, 7356, 7353, 7399]

Title word cross-reference

#26 [5528].

$((2^n)^m)$ [3829]. $(10^{31} - 1)/9$ [1990]. (2^m) [4384, 4405, 4589, 4598, 4503]. $(2^n + 1)$ [1084, 4823, 3942]. $(2^n - 1)$ [5044]. $(2^n - 1, 2^{n+p}, 2^n + 1)$ [6336]. $(2^n 2^q 1)$ [6136]. $(2^n \pm 1)$ [5555, 4170]. $(2m)$ [4468]. $(2n + 3)$ [6602]. $(2n - (2p \pm 1))$ [4885]. $(a \cdot x) \cdot x?$ [6888]. (d, r) [791]. (M, p, k) [5852]. $(\mathcal{R})$ [2932]. (p) [4384, 4468].

$(x + y) * (x - y)$ [6752]. -2 [745, 183, 206, 951, 803]. $-\infty < n < +\infty$ [141, 160]. 0 [5679]. $0 < N < 1$ [161]. $0 \div 0$ [701]. **\$1** [3771]. 1 [5024, 4377, 5188, 5680, 3725, 2183]. $1,000,000$ [620]. $1/\sqrt{x}$ [5823]. $1/t$ [2192]. $1/x$ [7247]. 10 [532, 6066]. 116 [4052]. 128 [4891]. 15 [532]. 16 [2526, 4218, 4105]. 17×69 [3071]. 2 [1007, 4335, 2065, 5717, 3254, 4024, 620, 6100, 431, 4377, 5045, 3310, 3488, 1773, 3498, 3165, 3505, 5653, 3520, 532, 322, 3711, 3848, 4484, 3725, 5132, 3388, 4977]. $2,576,980,370,000$ [5681]. $22n + 1$ [2164]. 256 [4471]. 27 [434]. $\{2^{(2n+1)} + 1, 2^{(2n+1)}, 2^{(2n+1)} - 1\}$ [6388]. $2^{(n+1)} + 1$ [4001]. $2^{2n+1} - 1$ [6081]. $2^{2n+2} - 1$ [6081]. 2^{2q} [6071]. $2^8 - 1$ [2879]. 2^k [4516, 5032, 5535, 5073, 5081]. $2^k + 1$ [868]. 2^{k-1} [4516]. 2^m [4590]. 2^n [1580, 6081, 4001]. $2^n + 1$ [4001, 5024, 5763, 4494]. $2^{n+1} - 1$ [6592]. 2^{n+k} [6592]. $2^n - (2^{n-2} + 1)$ [5375]. $2^N - 1$ [3011, 4858, 6592, 4247, 4001]. $2^q - 3$ [7108]. $2^q \pm 1$ [6071]. $2^q \pm 3$ [6071]. $2^x p^y \pm 1$ [6302]. 2×2 [5963]. 3 [378, 5026, 4212, 431, 4067, 4236, 4072, 5065, 4909, 322, 6271, 4151, 6677, 4974, 4975]. $3 - j$ [299]. 32 [4017, 4471]. 3×3 [2515]. 4 [4001, 4349, 4694, 2543, 2544, 431, 3455, 5768, 5561, 4416, 4750, 2974, 4105, 4107, 2834, 3025, 1946, 3553, 3558]. **\$49.95** [3738]. 5 [6071, 4835]. 54×54 [3512]. $6 - j$ [299]. 64×64 [2299]. 8 [434, 3468, 4105, 3520]. 84 [308]. **\$85.00** [4175, 4176]. 88062 [532]. $8k$ [6928]. 8×8 [5132]. $9 - j$ [299]. $<$ [6279]. $>$ [6279]. $[0, 1]$ [5188]. ^{0} [4390]. ^{2} [5781]. ^{4} [2819]. ^{5} [3929]. ^{e} [1162]. th [1162]. TM [4660]. $A(N + C)$ [1924]. $a + b$ [3667]. $a + b + c$ [6364]. $AB + CAB + C$ [7042]. $ab + cd$ [6151]. $ab + cd + e$ [7205]. $a \cdot (x \cdot x)$ [6888]. $A \cdot T$ [4098]. $\arctan Z$ [143]. $a \times b + c \times d$ [6364]. β [6397, 7154]. $C + AB^2$ [4314]. $c/\sqrt{(a^2 + b^2)}$ [6345]. $\text{CLP}(R)$ [2952]. $\cos^{-1}$ [3153]. $\cos N$ [180]. $\cos x$ [374]. $\cot^{-1} x$ [374]. d [4728, 5538, 3835]. Δ_2^0 [4978]. e [460]. e^n [141]. e^x [410]. ϵ [3501]. η_T [5709]. ηT [5280]. $\exp(x)$ [1369]. $\exp x$ [374]. $f(x) = 0$ [1226]. G_α [811]. $\text{GF}(2)[x]$ [5909]. $\text{GF}(2^m)$ [4438, 4807, 4421, 6101, 5011, 5466, 4941, 5913]. $\text{GF}(2n)$ [4233]. $\text{GF}(p^m)$ [4686]. H [5205]. $I^2 L$ [3263]. ∞/∞ [5052]. K [5474, 4335, 5965, 2124, 6053, 6397, 6009]. $k < m$ [6397]. L [4377]. L^2 [5288]. L^∞ [5287, 7072]. l_2 [6111]. $\ln(x)$ [1539]. $\ln x$ [374]. $\log n$ [1232]. $\log Z$ [143]. LU [6876, 6624]. M [4872, 180, 4165, 2648, 2653, 2662, 2942, 5369, 583, 6397]. $M^E \bmod N$ [2799]. $\mathbf{F}_2[X]$ [7153]. $\mathbf{f}_{2^m}$ [4263]. $\mathbf{F}_{5^{5n}}$ [5727]. $\mathbf{F}_{7^{7n}}$ [5727]. $\mathbf{R}^n$ [6994]. $\mathbf{Z}^2$ [4093, 5072]. $\text{GF}(2)$ [5343, 1705]. $\text{GF}(2^4)^2$ [6216]. $\text{GF}(2^{4n})$ [3953]. $\text{GF}(2^8)$ [6216]. $\text{GF}(2^k)$ [4999, 3800, 4957]. $\text{GF}(2^m)$ [5518, 4707, 5017, 3905, 4560, 5177, 3610, 4566, 3916, 5547, 2920, 2921, 3784, 4895, 5343, 5206, 4749, 4419, 5069, 2450, 5467, 4638, 4780, 4942, 5471, 3223, 4314, 4972, 4806, 2330]. $\text{GF}(2^n)$ [5031]. $\text{GF}(p)$ [2097]. $\text{GF}(p^m)$ [3516]. $\text{GF}(p_k)$ [4682]. $\text{GF}(q^n)$ [4730]. MECIPTI [283]. μ [1435, 4902, 4944, 2331]. μP [1622, 2022]. N [3996, 810, 2355, 2356, 160, 161, 180, 4609, 5105, 4963, 6009, 5729, 4193, 6111, 1301, 3651]. $n^{\text{ième}}$ [1162]. $N'_0 = -N_0^{-1} \bmod W$ [4291]. $N \geq 32$ [5898]. $n \log(n)$ [6539]. $n \times n$ [3164]. $O(1)$ [6435]. $O(n)$ [1199, 3458, 1559]. $O(n^2)$ [2800, 2801]. $O(n \log n)$ [6589, 6743]. Ω [4959]. $\text{Arccos} x$ [207]. $\text{Arcsin} x$ [207]. $\text{Arctan} x$ [207]. $\bmod p$ [1929]. P [6579, 4670, 2075, 1133, 896, 1047, 1647, 7154, 4307, 4656, 3376]. p^k [6760]. π [1642, 2254, 2255, 4635, 268, 5681, 1706, 460]. $p \times p$ [4614, 4759]. q [5825]. $q * m - n$ [1640]. QR [6176]. R [3631, 3085, 1617, 1625, 6478, 5898].

$r = m^k$ [1447]. r^a [4982]. $r^b - 1$ [4982]. $r^c + 1$ [4982]. $\{r^n - 2, r^n - 1, r^n\}$ [5334]. $r \geq 8$ [5898]. s [4913]. $\sin(\mathbf{BIG})$ [5269]. $\sin^{-1}$ [3153]. $\sin N$ [180]. $\sin x$ [374]. $\sqrt{(a^2 + b^2)}$ [6345]. $\sqrt{(x)}$ [1491]. $\sqrt{(x/d)}$ [3877]. $\sqrt{2}$ [7076]. $\sqrt{x}$ [1315, 452]. $\sqrt{x^2 + y^2}$ [5717]. T [6641]. $\tan^{-1} x$ [374]. $\theta(\log N)$ [2376]. $\times$ [4098, 3947, 4164]. w [4767]. X [1554, 2917]. $x^2 + ny^2$ [3738]. x^n [6033, 3334]. $x \star (1/x) \neq 1$ [3271]. y [4447]. Z [5366].

-2 [1006]. **-adic** [1133, 1047, 1647, 2075, 896]. **-Approximations** [7072, 5287, 5288]. **-ary** [2942, 4165]. **-b** [3512]. **-Bit** [4017, 6928, 308, 6009, 5105]. **-body** [4609, 4963]. **-circulant** [6478]. **-Coordinate** [4447]. **-count** [6641]. **-CSRmesh** [6525]. **-D** [5717, 4212, 4236, 3310, 6271, 4151, 5132, 3388, 2183]. **-Depth** [3458]. **-Digit** [434]. **-Dimensional** [5538, 2065, 4728]. **-Fold** [5474]. **-Friendly** [5852]. **-function** [5205]. **-gram** [5729]. **-Matrix** [4872]. **-Moduli** [6071, 4001, 4694, 4835]. **-Norms** [6111]. **-Order** [3631]. **-Partition** [6053]. **-Real** [4978]. **-select** [4193]. **-sets** [3085]. **-spaces** [4913]. **-th** [5965, 3835, 5825, 2356]. **-transform** [5366]. **-Vectors** [6111].

.NET [6488, 5108].

/m [4902]. **/spl** [4902].

0.18-CMOS [5819]. **0.4.1rc** [6489]. **0.80pJ** [6628]. **0.80pJ/flop** [6628]. **'00** [7534, 7539, 2562]. **'01** [7548]. **02448** [2053]. **02448-9** [2053]. **'03** [7577]. **'04** [7586, 7594]. **'07** [7629, 7635, 7637, 7642]. **'08** [7646, 3056, 5414].

1 [217, 3576, 6716, 3439, 2900, 228, 63, 65, 67, 565, 3302, 6750, 4098, 4441, 1166, 5819, 7159, 1947, 3897]. **1-GHz** [6716, 4441, 5819]. **1-Output** [5380]. **1.0** [3898]. **1.24Tflop** [6628]. **1.24Tflop/sW** [6628]. **1.5** [5697]. **10** [5781]. **10-kA** [5781]. **10-kA/cm** [5781]. **10/20** [960]. **100** [2913, 2914]. **100-MFLOPS** [2913, 2914]. **1014** [6830]. **1057** [1995]. **10858** [1759]. **10967** [4395, 5194]. **10967-1** [3302]. **10967-2** [4395]. **10967-3** [5194]. **10th** [7344, 7678, 7426, 7555, 7568, 27, 7325, 2786]. **'11** [7673, 1113, 1399, 1517, 1416, 1320]. **11-bit** [4944]. **11/780** [2051, 1581, 1582, 1816, 1021]. **116** [270]. **1164/WTL** [2047]. **11i** [4960]. **11th** [7546, 7439, 7457, 7458, 3208]. **120B** [1123]. **128-bit** [6386, 4149]. **12th** [7589, 7655, 7300, 7481, 3483, 7641]. **13** [4354, 2106]. **132-Bit** [343]. **13th** [7574, 7316, 7500, 7470, 7628, 3876, 3804, 7698]. **14-Port** [3947]. **144** [2050]. **14th** [7461, 7545, 7576, 7627, 7539, 7525]. **15** [2789]. **15-b** [4486]. **15-bit** [4154]. **15C** [1641]. **15th** [7364, 7635, 7300, 7643, 7547, 7593]. **16-19** [7264]. **16-b** [6528]. **16-Bit** [4565, 6758, 6775, 7169, 6928, 3047, 1265, 1613, 5029, 3100, 1772, 6385, 6004, 1486]. **16-bit-** [1622]. **16-bit-Multiplikation** [1486]. **16-by-8-bit** [1657]. **16-Digit** [5400]. **160-ns** [2858]. **160-Word** [3947]. **1620** [255]. **164** [1828]. **167** [3520, 3558]. **16BST** [1830, 1746, 1747, 1749, 1753, 1763, 1776, 1785, 1702]. **16F/400** [919]. **16th**

[7618, 7609, 4683, 7573, 7615]. **17** [288, 840]. **17-Bit** [650, 649]. **1788** [6616]. **1788-2015** [6125]. **17th** [7680, 7620, 7536, 7610, 7613]. **'18** [7691, 564]. **18-21** [7626]. **18-decimal** [1698]. **18.Mai** [1494]. **18th** [7645, 7634, 7640, 5508]. **18th-Century** [5508]. **1945** [61]. **1947** [7256]. **196** [5725, 5736]. **1962** [7264]. **1965** [7268, 7270]. **1967** [7275, 7277]. **1968** [7280]. **1969** [7278, 7279, 589]. **1971** [7290]. **1972** [7288, 4079]. **1973** [4156, 4157]. **1975** [7297]. **1976** [7298, 7300]. **1977** [7301, 7326, 1664]. **1978** [1266]. **1979** [7306, 7309]. **1980** [7310, 7316, 1535, 7321, 7318]. **1981** [7323, 7328]. **1983** [7344]. **1984** [7353]. **1985** [7370]. **1987** [2103]. **1988** [7373, 7384]. **1989** [7397, 2601]. **1989-01** [2407]. **1989/Taipei** [7397]. **1991** [2657, 7419, 2786]. **1992** [2878, 7482]. **1993** [7450, 7493, 3208]. **1994** [7471]. **1994-12** [3302]. **1995** [7472, 7484, 3483]. **1998** [7510, 7512, 3924]. **1998-12** [3923]. **1999** [7522, 7523, 7528, 7530]. **19th** [7653, 7623]. **1st** [7507].

2 [2195, 6540, 2539, 1747, 64, 66, 68, 4395, 4068, 4607, 6497, 3950, 4927, 530, 2028, 7160, 3542, 4149, 4799, 2844, 3037]. **2-D** [3542]. **2-Digit** [4206]. **2-dimensional** [3012]. **2.0** [3647]. **2.44** [4067, 4236]. **20** [2688, 1408, 2421]. **20-MFLOPS** [2422, 2421]. **200-ns** [1495]. **'2000** [7533, 7532, 7533, 7539]. **2001** [7544, 7545, 7547, 4860, 7549, 7555, 7556]. **2002** [7558, 7559, 7561, 7562, 7563, 7570]. **2003** [7573, 7574, 7577, 7578]. **2004** [7585, 7586, 7588, 7594, 7595, 4919]. **2005** [7602, 7603, 7605, 7608, 7614]. **2006** [7617, 7618, 7621, 7625]. **2006Petrozavodsk** [7675]. **2007** [7629, 7631, 7632, 7634, 7637, 7639, 7649, 7644]. **2008** [7645, 7646, 5520, 7648, 6601, 5971, 5972, 6770, 5572, 5802, 5595]. **2009** [7651, 7655, 7658, 7659, 5553]. **2010** [7668, 7669, 7671]. **2011** [7674]. **2013** [7679]. **2015** [7682, 7683]. **2016** [7687]. **2017** [7688]. **2018** [6511]. **2019** [6566, 7693, 7694]. **2020** [6698, 6696, 6697, 6699, 6700, 6702, 6723, 7695, 6749]. **2020s** [6815]. **2021** [6815, 6816, 6817, 6818, 6826, 7699, 6873, 6892]. **2022** [6933, 6934, 6935, 7701, 6962, 6963]. **2023** [7703]. **20th** [7657, 7697, 7676, 7638]. **21-23** [7655]. **2100** [2580]. **21064** [3368]. **210uW** [6459]. **210uW/MHz** [6459]. **21164** [3413]. **21st** [7663, 7591, 7535, 7679, 7652]. **22** [338]. **22-nm** [6716]. **22nd** [7683]. **22nm** [6628]. **23-28** [7622]. **23nd** [7687]. **23rd** [7409, 7666, 7669]. **24** [1130]. **24-26** [7575]. **24-bit** [2386]. **24.und** [7326]. **24732** [5196]. **248GOPS** [6906]. **248GOPS/W** [6906]. **24b** [2483]. **24th** [7688, 7508, 7511, 7565, 7671, 7326]. **25-28** [7534]. **256** [6342]. **25th** [7405, 7521, 7326, 7636, 7692]. **26-28** [7586]. **26th** [7671, 7694]. **27th** [7695, 7668]. **281** [3079]. **286** [3666]. **28nm** [6906]. **28th** [7699, 7516]. **29.95** [3738]. **29th** [7524, 7701]. **2B** [647]. **2DFFT** [1896]. **2nd** [7667, 4611, 7289]. **2Sum** [6192, 6301].

3 [3117, 5194, 6472, 2792, 6165]. **3-519-** [2053]. **3-ps** [5819]. **30** [2050]. **30-bit** [2443]. **30-MFLOP** [2266]. **30-ns** [3498]. **300** [4236, 1233]. **300-MHz** [4236]. **300MHz** [4067]. **30th** [7703]. **312** [433]. **3171** [2521]. **31st** [7378]. **32** [5150, 2077]. **32-** [7003]. **32-Bit** [3746, 2334, 2202, 2347, 5512, 4838, 3439, 1411, 5041, 1635, 2757, 2428, 2429, 2430, 2431, 6882, 2579, 2010, 2453, 3336, 2591,

3212, 3983, 2506, 3227]. **320** [3120]. **320-MFLOPS** [3121, 3120]. **320C25** [3314]. **32b** [2266]. **33** [2232]. **33rd** [7489, 7540, 7433]. **34** [514]. **34-MFLOP** [2506]. **360** [418, 419, 506, 384, 392, 393, 683, 440, 482, 1450, 6507, 539]. **3600** [303]. **36th** [7453]. **370** [1959, 2051, 2500]. **37th** [7639]. **390** [4109, 3843, 3844, 4135, 4136]. **39th** [7629, 7646]. **3CT** [3408]. **3DNow** [3950, 4068]. **3DTV** [5808]. **3m** [6412]. **3rd** [7505, 7293, 7611]. **3Sum** [7237]. **3X** [5472].

4 [3418, 4824]. **4-2** [1170]. **4-bit** [6793]. **4-Input** [5380]. **4-Input/1-Output** [5380]. **4.4ns** [3512]. **40** [2430]. **40-MFLOPS** [2428, 2430]. **40ns** [650]. **400** [919]. **4000** [499]. **400MHz** [3947]. **400th** [7482]. **4096-Core** [6921, 6802]. **40ns** [649]. **41** [444]. **432** [1869]. **44th** [7625]. **45th** [3791]. **48th** [7608]. **4d** [4705]. **4m** [6412]. **4Sum** [7237]. **4th** [1266, 7303, 7534, 7428, 7556, 7702].

5 [3568, 4178, 7023]. **50** [2345]. **50-Megacycle** [149]. **50-MHz** [2345]. **501** [3808, 3657]. **50th** [7465]. **512** [6421, 7084, 7223]. **512-bit** [6948]. **528** [1121, 4050]. **53*53** [3288]. **53nd** [7664]. **54** [339]. **54-b** [2858]. **55-b** [3498]. **5th** [7572, 7654, 7320, 7623, 7479].

6.7-MFLOPS [2464, 2466]. **60** [607, 580, 411]. **600** [4016]. **600-MHz** [4016]. **6000** [3408, 2557, 638, 2582, 2586, 1247, 3390, 719]. **6000/7000** [1038, 1247]. **600MHz** [4109]. **601** [3368]. **603e** [3640]. **60M** [2656]. **60M-flops** [2656]. **64** [4812, 4023, 4198, 4058, 4224, 4225, 6587, 4270, 4145]. **64-active-instruction** [3554]. **64-b** [3666, 2981, 3554]. **64-Bit** [2454, 3947, 7148, 2342, 2345, 5421, 5163, 5023, 3093, 3456, 5188, 2734, 3472, 2421, 2422, 2567, 2426, 2948, 7003, 2791, 2280, 3350, 4961, 2047]. **64-bit-Universal-Floating-Point-ISA-Compute-Engine** [6587]. **6400** [1707]. **64b** [2344]. **65** [626]. **65-nm** [7148]. **65/6600** [626]. **650** [2105]. **651** [2064]. **65nm** [6459]. **6600** [733, 556, 626, 593, 1353]. **6600/7600** [733]. **665** [2220]. **68000** [1897]. **68000-Einplatinenrechner** [2096]. **693** [2828]. **6th** [7619, 4868, 7584, 7333, 7523, 7638, 7501, 7614, 7588].

7-9 [7657]. **70** [5721]. **7000** [1247]. **7094** [398, 474]. **7094-II** [474]. **70th** [5633]. **714** [3076]. **715** [3078, 3694]. **719** [3057]. **722** [3077]. **7289** [7076]. **73** [1031]. **754** [3870, 5604, 2880, 4337, 3421, 6087, 4007, 4543, 5520, 6566, 6961, 3898, 4359, 6849, 4857, 6855, 6856, 1417, 6598, 6870, 6224, 1874, 6601, 2109, 3478, 3643, 5633, 5979, 5357, 4265, 5080, 5215, 6999, 6637, 7141, 7142, 2292, 6511, 6394, 7154, 1691, 4786, 3968, 5674, 2030, 1468, 6794, 7222, 3377, 5590, 5595, 5830, 7177]. **754-1985** [1873, 1874]. **754-2008** [5457, 5520, 6601, 5595]. **754-2019** [6600, 6566]. **754-Posit** [6999]. **754r** [5448, 5153, 5166, 5298, 5521, 5199, 5252, 5198, 5211, 5400]. **7600** [733]. **77** [1194, 4050, 1339]. **780** [2051, 1581, 1582, 1816]. **786** [3972]. **78CH1412** [1266]. **78CH1412-6** [1266]. **'79** [7306, 7309]. **7th** [7310, 7312, 7617, 7351, 7381, 7622].

8 [1302]. **8-Bit** [3837, 6918, 7055, 1981, 7106, 7130, 7009, 7147, 6523]. **8-to-64** [6628]. **80** [1493]. **80*87** [3038]. **80-bit** [1942]. **80-FLOPS** [2981]. **8000** [3472]. **80287** [1916]. **8080/8085** [1595, 1136, 1223]. **8080A** [1497]. **8085A** [2408]. **8086/80286** [1949]. **8087** [7232, 1641, 1323, 1916, 1698]. **8087/80287** [1949, 1916]. **8087/80287/80387** [2310]. **8088/8087** [1746]. **80960** [2262]. **80960KB** [2263]. **80b** [2465]. **80h** [1302]. **80's** [7315]. **814** [4474]. **8231A** [4174]. **826** [6459]. **'83** [7336]. **83S87** [2534]. **'84** [7345]. **842** [5034]. **'85** [7350, 482]. **854** [3428, 3429, 2103, 3502]. **854-1987** [2055, 2103]. **'86** [7357, 7358]. **86TM** [3946]. **871** [5477]. **'88** [7379, 7380, 7383, 2327]. **881** [5536]. **'89** [7391, 7398]. **89/TI** [4487, 4488]. **8s** [767]. **8th** [7403, 7603, 7512, 7365, 5663].

9 [2053, 518, 697]. **9-11** [7631]. **9.4** [6906]. **'90** [7401, 7410, 7425, 4330, 3412, 4994, 4995, 2698, 3510, 4474, 3862]. **908** [5693]. **90nm** [4824]. **'91** [7422, 7425, 417, 396]. **'92** [7431, 7434, 7437, 7445, 4487, 4488]. **'93** [7448]. **'94** [7460, 7461, 7470]. **'95** [7477, 3875, 4470, 4783]. **954** [6103]. **'96** [7491, 7495]. **96-bit** [2276]. **97** [3739]. **'98** [7508, 7516, 3993, 7506]. **980A** [1017]. **'99** [7521, 7522, 7523]. **9th** [7394, 7669, 7626, 7328, 2378].

= [2822, 2823, 3370, 7290].

Imaginary_I [5590].

A-Priori [2117]. **A-profile** [7231]. **A.K** [4700]. **a.k.a** [5567]. **A/D** [3914, 907, 3370, 4154, 4486, 803]. **A/D-konverter** [3370]. **A1** [1101, 1196]. **Aarhus** [7333, 7333]. **Abacus** [202, 1028, 5571]. **Abbreviating** [7]. **abc}** [4842]. **ABE** [548]. **ABI** [6929]. **Abnormal** [6811, 6075]. **Abotec** [3202]. **Absolute** [3415, 3416, 2782, 2270, 433]. **Abstract** [5612, 4571, 5649, 527, 5363, 5893, 6407, 4869, 2932, 2128, 5894, 4922, 4934, 3006]. **abstraction** [5507, 5871, 1337]. **abstraction-based** [5507]. **Abstracts** [7449, 7540]. **Abu** [408]. **Acadiana** [7512]. **ACBAM** [7021]. **ACBAM-Accuracy-Configurable** [7021]. **Accelerate** [6649, 6334, 4609]. **Accelerated** [6854, 5047, 5519, 5733, 6491, 7043, 7168]. **Accelerating** [5497, 6080, 4830, 3893, 5743, 6972, 6853, 6215, 7101, 7124, 4264, 6767, 6376, 4757, 6381, 5811]. **Acceleration** [6738, 6876, 6241, 7250, 6869, 6481]. **Accelerator** [6082, 6827, 6546, 5725, 5737, 7083, 5762, 7104, 6353, 6989, 6372, 2271, 6497, 6771, 7140, 6055, 7018, 4942, 7167, 7036, 7252, 6675, 6436, 2284, 7157]. **Accelerators** [6976, 7092, 6610, 7111, 6881, 7132, 6501, 7175, 4802, 7047, 5310, 3526]. **Acceptance** [3510]. **Access** [2160, 5141, 3421, 4612, 4666, 7043]. **Accessibility** [7601]. **Accessible** [6971]. **Account** [3, 5590]. **Accumulate** [6561, 5018, 6458, 6872, 6477, 6777, 7026, 6002, 3851, 6689, 6805, 4535, 6627, 3695]. **Accumulated** [1375, 576, 978]. **Accumulation** [6305, 2071, 1972, 179, 5967, 6232, 5339, 6131, 5578, 4457, 77, 454, 1074, 3733, 5850, 3759, 3784, 5788, 575, 5575, 2785, 95, 5480]. **accumulations** [4264]. **Accumulator** [3887, 4795, 6278, 380, 2715, 1033, 3336,

5820, 5908, 4797]. **Accumulators** [6554, 6374, 371, 1075]. **accuracies** [2621]. **Accuracy** [4674, 217, 6282, 7060, 6943, 1727, 5502, 862, 1016, 4828, 5421, 7191, 6838, 6839, 2696, 5938, 6093, 3260, 5945, 6203, 5306, 5174, 6210, 1853, 227, 228, 7198, 7199, 7235, 434, 390, 1296, 1864, 3633, 4580, 4392, 2399, 6468, 1758, 1994, 2561, 1632, 7107, 1997, 5962, 6349, 1639, 2419, 7112, 3138, 754, 5209, 6765, 833, 7241, 5214, 3819, 7021, 5817, 3185, 6267, 3702, 165, 7026, 1696, 2034, 2035, 6794, 411, 3550, 6916, 7038, 495, 6806, 6807, 5412, 7049, 5920, 5704, 5849, 1825, 4689, 5936, 6314, 6846, 6098, 6979, 3783, 3114, 1757, 6752, 2565, 2114, 2007, 5208, 5882, 5210]. **accuracy** [6490, 3812, 1768, 5372, 6158, 7149, 1690, 107, 2479, 1698, 1701, 1935, 1797, 6405, 2317, 2318, 3215, 6522, 3867, 546, 5146, 2067, 1214, 3671, 652, 1360, 2589]. **accuracy-adjustable** [7149]. **accuracy-guaranteed** [5372]. **Accurate** [5606, 5150, 1817, 2667, 2670, 2887, 7190, 1392, 4369, 4555, 4556, 4557, 4710, 4852, 4853, 3764, 4373, 6027, 6205, 6319, 4035, 5311, 2713, 6103, 4725, 4865, 4867, 5317, 2720, 5436, 5543, 5549, 4389, 6599, 6124, 5961, 5632, 5780, 5965, 5966, 3307, 5967, 6232, 230, 2569, 2257, 6990, 6620, 3321, 906, 572, 3493, 641, 5800, 6636, 7354, 4925, 4926, 5098, 6504, 6056, 2997, 1547, 5106, 5473, 5474, 5475, 5581, 5664, 5994, 5995, 3704, 3840, 3842, 4954, 5121, 4144, 2627, 6065, 6913, 3040, 599, 6010, 4515, 1807, 5839, 3069, 5284, 3261, 3442, 4711, 4203, 2383, 5542, 6326, 4230, 5960, 1880, 5963, 2753, 7240]. **accurate** [3142, 759, 760, 2972, 4764, 2980, 4766, 6156, 4279, 2163, 4478, 5247, 3027, 2860, 5490, 5266, 1097]. **Accurately** [3584, 6559, 2531, 5778, 5066, 2623, 4952, 6560, 6309, 4839, 4840, 5646, 5671]. **ACE** [947, 5138]. **achieved** [3044]. **Achieving** [6074, 5421, 5723, 6322, 1853, 4770, 5901]. **ACL2** [7558, 4296]. **ACL2-2002** [7558]. **ACM** [7373, 7460, 7585, 7586, 7601, 7602, 7616, 7629, 7645, 7646, 7621, 7548, 7564, 2106, 7570, 7587, 2365, 7478, 7425]. **ACM/IEEE** [7616]. **ACM/SIGDA** [7585, 7602]. **ACM/SIGPLAN** [7587]. **Acoustics** [7357, 7423, 7577, 7594]. **Acousto** [1920]. **Acousto-Optic** [1920]. **acquisition** [2520, 2688]. **ACRITH** [1994, 1825, 2561, 1997, 1882, 2119]. **ACRITH-XSC** [2561]. **across** [5357]. **ACSSC** [7649]. **ACT8837** [2357]. **ACTION** [6992]. **Activation** [6722]. **Activations** [6357]. **active** [5808, 3554]. **Activity** [5918]. **Actual** [5350, 6550]. **acyclic** [3230]. **Ada** [7460, 7403, 7439, 1885, 7460, 2340, 2663, 2664, 2889, 2890, 3250, 2524, 2681, 3445, 2371, 2089, 6105, 2545, 7439, 1535, 1762, 2120, 1769, 3663, 2787, 2155, 2831, 1714, 2859, 1493]. **Ada-Europe** [7439]. **Ada83** [3060]. **adaptable** [4361]. **Adaptation** [2893, 4431, 6901]. **adapted** [6037]. **Adapting** [2952, 4050]. **Adaptive** [5862, 6605, 4251, 3133, 1645, 2942, 6764, 6879, 6248, 2467, 1782, 3709, 3710, 3845, 1472, 1561, 7036, 2191, 1961, 1594, 1733, 4837, 5010, 6464, 5189, 2411, 3806, 3938, 1768, 2447, 6146, 2983, 3169, 5816, 3722, 5682]. **ADC** [4385, 2472, 4164, 4981]. **ADCOM** [7635]. **Add** [6543, 5505, 3071, 4692, 5008, 6305, 4352, 5517, 7082, 6206, 5185, 2558, 6746, 5335, 3473, 6474, 3925, 4413, 5353, 5354, 5355, 3144, 5797, 5579, 5661, 5464, 5465, 5105, 7022, 4787, 7170, 6271, 6416, 6688, 6569, 4516, 2349, 4832, 5720, 3075, 3608, 5039, 4056, 5046, 6220, 4585, 5050, 4599, 4903, 4097, 6044, 5083, 4766, 3173, 5670, 4794, 4968, 1717, 4668, 4809]. **add/sub** [3608]. **Addendum** [1234, 764]. **Adder**

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3314, 5561, 7239, 829, 4253, 7207, 3484, 2429, 2944, 2945, 1141, 5344, 5345, 5878, 4411, 3801, 752, 753, 895, 2001, 4594, 897, 1048, 754, 6131, 5880, 5971, 3318, 6617, 6618, 6761, 6990, 6991, 6357, 6358, 4599, 4903, 6762, 6135, 6235, 6361, 6363, 5209, 1648, 6138, 5068, 2120, 350, 2439, 2763, 2765, 2953, 6237, 4602, 4905, 5071, 6238, 6366, 6620, 5792, 5793, 6881, 1538, 441, 5353, 5354, 7119, 7121, 6242, 1144, 6491, 2122, 5213, 6042, 6492, 833, 906, 1439, 572, 5794, 6243, 3322, 2958, 2959, 2266, 2446, 6374]. **Floating** [6626, 2769, 7241, 1902, 4919, 2577, 94, 6628, 1772, 641, 688, 2579, 5982, 3668, 981, 6495, 1652, 2776, 7127, 1654, 6245, 3152, 5890, 6886, 4613, 527, 578, 912, 1150, 3816, 5801, 403, 2584, 1151, 4433, 7000, 6380, 2012, 6381, 3500, 3161, 5651, 4434, 7131, 7213, 984, 2274, 5572, 5363, 3819, 450, 6047, 6048, 6384, 6385, 6386, 6637, 6638, 363, 2454, 5574, 1541, 1776, 6248, 6640, 643, 1908, 2134, 2277, 2458, 2459, 3166, 5089, 5655, 6250, 6499, 1446, 3947, 1154, 2135, 2788, 7141, 4441, 2465, 2466, 6501, 6642, 6775, 5985, 917, 5096, 5986, 6054, 3823, 5222, 5371, 7140]. **Floating** [3510, 2797, 4111, 3680, 3682, 3684, 3826, 3827, 4110, 5099, 2591, 2986, 2592, 5988, 4448, 7244, 2800, 2801, 5457, 7143, 2017, 646, 1061, 1332, 2595, 2283, 4287, 6256, 647, 6781, 1159, 1238, 1334, 5990, 6055, 5659, 2145, 7148, 703, 4290, 4456, 6056, 2287, 2808, 2809, 3177, 2021, 6647, 5579, 839, 2812, 2997, 1785, 6162, 2604, 3180, 4936, 5661, 5464, 5465, 2022, 6507, 6508, 2293, 993, 3000, 7245, 2294, 1242, 3698, 923, 924, 6260, 2295, 995, 3183, 2296, 4639, 5662, 2297, 6262, 2820, 5106, 5473, 5474, 5664, 5996, 4296, 6784, 6513, 1552, 6400, 1691, 454, 1692, 6401, 3963, 3964, 5108, 1555, 4127]. **Floating** [2616, 1463, 1788, 4947, 5110, 5381, 2303, 4135, 4302, 4472, 4787, 5111, 5818, 7159, 4646, 5113, 3007, 1697, 7164, 1789, 5674, 5907, 2617, 3710, 4951, 2483, 3712, 269, 212, 2165, 3008, 2031, 5821, 1558, 2485, 789, 1699, 2828, 3014, 3203, 3204, 3205, 3369, 3716, 3717, 2308, 6001, 6270, 7030, 7170, 3370, 6167, 6168, 6659, 2034, 2035, 1702, 1703, 3019, 6002, 2623, 4952, 5240, 5241, 5242, 5243, 5478, 5479, 5480, 5481, 5482, 2832, 3020, 845, 1346, 1468, 1469, 1798, 5585, 3974, 3975, 5123, 1173, 1348, 2312, 4146, 2039, 5910, 4305, 6271, 3977, 1799, 5587, 2492, 2629, 2630, 3026, 5126]. **Floating** [5127, 1475, 5588, 6794, 1802, 5250, 5394, 3546, 4960, 6170, 6672, 4154, 594, 3374, 4489, 6407, 7173, 6065, 7174, 6519, 1075, 5395, 2041, 3859, 850, 5396, 5589, 2845, 3215, 3547, 2847, 6796, 3377, 6408, 2849, 2850, 1357, 5130, 1078, 5591, 5912, 3726, 1358, 3862, 3218, 6276, 6520, 6521, 2321, 3981, 215, 6416, 1479, 1714, 2639, 1715, 5136, 5259, 5403, 5404, 5598, 5599, 5686, 5689, 6523, 1568, 1362, 1481, 1482, 1483, 1484, 3985, 2047, 7249, 5830, 7177, 2048, 3035, 3036, 6007, 216, 3226, 2324, 6278, 2859, 4315, 6175, 134, 1810, 5262, 7225, 6008, 2647, 801, 1365, 3043, 1719, 3558]. **Floating** [5410, 5833, 4169, 950, 1955, 6802, 6921, 6922, 6010, 6688, 5143, 5602, 5693, 5144, 5411, 5268, 6690, 5619, 5740, 5940, 4658, 6411, 4313, 1951, 2190, 3402, 5412, 664, 2874, 1957, 1958, 6526, 3990, 1576, 5696, 6280, 3047, 3737, 3874, 5492, 5493, 6075, 6180, 6076, 722, 297, 1495, 2514, 2656, 3053, 3239, 3407, 3408, 3409, 3410, 4522, 6424, 6535, 6536, 7056, 2515, 1088, 1012, 5701, 1813, 2334, 1814, 1815, 1370, 2336, 1581, 1582, 2057, 2337, 4817, 6184, 4179, 1497, 2518, 2884, 3061, 5608, 5926, 2059, 1376, 1820, 2199, 2519, 2200, 5927, 4334, 2061, 2341, 7061, 2665]. **floating**

[3246, 3063, 2342, 4337, 5278, 5279, 1094, 2201, 1378, 2345, 5849, 4822, 2520, 1194, 5159, 3884, 2346, 6297, 2347, 2205, 2668, 2669, 3069, 1826, 4342, 4537, 4688, 4825, 4826, 4827, 5160, 5282, 6017, 6299, 3749, 1729, 300, 2206, 668, 5285, 5610, 4345, 3885, 1017, 4830, 5420, 5611, 7069, 7070, 7188, 2207, 1018, 1197, 6433, 5853, 6713, 3251, 5009, 3585, 1275, 1828, 2209, 2678, 7190, 6435, 1968, 6555, 1385, 6556, 3428, 6306, 1386, 4837, 5010, 2684, 3253, 380, 1597, 6437, 3888, 5013, 1831, 2072, 2688, 3755, 3890, 5934, 1388, 1735, 2219, 2357, 4543, 5517, 4012, 4013, 6020, 4839]. **floating** [4840, 4016, 1601, 5519, 5733, 6198, 4196, 2697, 1107, 1975, 4022, 4706, 4550, 422, 5522, 3439, 5735, 7233, 2364, 2894, 2895, 2896, 3898, 4028, 3262, 6316, 2702, 6317, 5429, 5430, 961, 1283, 2704, 6447, 6023, 5741, 3083, 2902, 3266, 3443, 4556, 4711, 4852, 6202, 6098, 4031, 3085, 249, 4856, 5173, 5303, 4370, 963, 4559, 5620, 6728, 5175, 2538, 5308, 2539, 5023, 2370, 4203, 2906, 5309, 2224, 504, 1746, 1747, 2908, 6029, 4034, 1206, 5311, 5176, 5530, 736, 1119, 5029, 4208, 4209, 6977, 4721, 4722, 5623, 1522, 1982, 2382, 1749, 1983, 821, 510, 3769, 1208, 5318, 1031, 6322, 2914]. **floating** [2386, 4870, 6733, 4728, 5865, 4729, 283, 3100, 3278, 4731, 4873, 3101, 2548, 623, 881, 1032, 1212, 1290, 1752, 3455, 2916, 3102, 1033, 2725, 1856, 5540, 1857, 2552, 1858, 5750, 2392, 4876, 4877, 1859, 5436, 6033, 6112, 6581, 7236, 7237, 1294, 2393, 252, 178, 3914, 2397, 1863, 4385, 4880, 3915, 2554, 6981, 4055, 6740, 6741, 3104, 4056, 5041, 3622, 5871, 7098, 4057, 4574, 4735, 6585, 6586, 2918, 2919, 3624, 6464, 3107, 3461, 3625, 1298, 1415, 1217, 1988, 3627, 2238, 3462, 1416, 1304, 3287, 3114, 4063, 2239, 4582, 2924, 2557, 3115, 2734, 5331, 5332, 1757, 2927, 6469, 6599]. **floating** [6747, 5764, 2100, 5765, 518, 828, 1219, 2405, 5767, 683, 2407, 1222, 1876, 1759, 3302, 3637, 5194, 5195, 5197, 5553, 2242, 2243, 4067, 4585, 7238, 3636, 1136, 1223, 1879, 2408, 4742, 5960, 2930, 4587, 5775, 5776, 1636, 3305, 6035, 6229, 6346, 6347, 6475, 201, 2104, 3640, 6036, 6479, 2246, 2935, 3126, 3306, 6037, 2248, 2417, 2418, 2249, 3127, 2108, 2109, 3478, 3643, 3644, 4244, 4246, 5633, 5781, 4744, 2939, 3308, 3480, 3646, 3309, 6129, 630, 475, 746, 2421, 2422, 2423, 2424, 748, 749, 1228, 2256, 2114, 1644, 312, 522, 4896, 4897, 6354, 2757, 7240, 1229, 1230, 2428, 2430, 2431]. **floating** [1764, 1887, 1537, 1765, 5640, 6876, 3652, 3933, 4412, 3139, 3317, 4900, 5642, 2948, 3485, 5346, 831, 899, 975, 2007, 4256, 5972, 6133, 4902, 2573, 3319, 901, 977, 2950, 7116, 2262, 2263, 5974, 6484, 6360, 3936, 3937, 5882, 5210, 7208, 6240, 757, 2764, 2952, 3141, 4601, 5885, 6139, 6040, 5978, 4906, 3809, 4426, 4607, 352, 4609, 3940, 6882, 4907, 526, 573, 5646, 1770, 5357, 3659, 5647, 5980, 1650, 5359, 5360, 4264, 6044, 4909, 6627, 2268, 7242, 1053, 2009, 1321, 2965, 3666, 575, 642, 759, 760, 402, 690, 691, 576, 6045, 2270, 4911, 2010, 2011, 982, 911, 3151, 1443, 2583, 4614, 4759]. **floating** [6146, 3154, 2272, 2131, 2779, 5083, 2273, 5362, 3160, 6769, 7130, 1658, 1659, 1660, 697, 2585, 5802, 5893, 3502, 5364, 4918, 5085, 5366, 5367, 5368, 5452, 5573, 7003, 2586, 2013, 3946, 5088, 5454, 320, 1907, 2276, 2457, 2460, 2785, 3676, 6050, 2978, 2979, 919, 7137, 2463, 2464, 986, 4277, 3336, 4766, 2280, 3169, 6253, 3337, 3338, 3952, 2468, 3828, 4927, 7014, 3343, 582, 4928, 5372, 5899, 6255, 482, 4279, 3171, 3172, 5373, 5577, 6158, 5900, 987, 4282, 4116, 4285, 5808, 767, 988, 3831, 4117, 7146, 4772, 3350, 6160, 4931,

1335, 2018, 5809, 7147, 2284, 208, 702, 991, 2285]. **floating** [2992, 2286, 3833, 7149, 2288, 2601, 3352, 528, 7150, 3521, 2289, 7255, 2605, 2814, 2999, 4937, 2292, 3355, 4120, 5812, 6258, 2473, 2608, 2818, 2609, 2610, 1786, 2153, 1340, 5103, 6901, 994, 530, 1245, 1246, 1341, 708, 1065, 3001, 1066, 3356, 1689, 485, 4943, 3525, 775, 5993, 5666, 5667, 5902, 6265, 5815, 3960, 3961, 4124, 1344, 4944, 4641, 1927, 3184, 107, 5816, 5670, 6514, 999, 3002, 2479, 3962, 5671, 3701, 3359, 778, 2027, 2300, 2615, 2159, 7158, 4945, 6062, 711, 712, 3195, 3843, 4136, 4786, 5582, 2481, 3965, 4473, 4949, 4950, 5819, 3967, 3707, 2822, 2823, 3005, 3006]. **floating** [2824, 3366, 3200, 2305, 3709, 3845, 4647, 928, 3201, 3534, 6518, 2030, 3535, 1068, 3969, 5236, 4143, 4474, 6789, 3846, 2488, 1701, 1935, 3018, 4649, 2309, 1172, 2489, 2490, 4475, 4476, 4651, 5118, 5119, 5120, 5244, 5245, 5386, 5387, 5388, 5389, 1797, 1470, 293, 1471, 2038, 4794, 3720, 4149, 376, 324, 4796, 847, 2840, 2841, 3211, 3212, 5125, 1942, 3721, 147, 1474, 1800, 1944, 2315, 1948, 1801, 3027, 5249, 6405, 3028, 1709, 848, 3373, 4486, 4961, 1074, 3375, 1354, 4155, 4311, 7222, 1804, 3723, 1805, 1710, 1950, 4158, 4312, 2043, 943, 6409, 4964, 4965, 717, 796, 3724, 1806]. **floating** [2637, 2498, 2500, 4492, 4493, 2045, 5257, 1359, 2852, 2178, 494, 3221, 2503, 851, 3983, 2506, 3031, 4803, 4970, 5258, 5405, 5829, 6277, 2507, 1808, 1716, 1363, 1809, 542, 543, 544, 2180, 2323, 5137, 797, 2508, 2509, 1260, 295, 1717, 2181, 3227, 3392, 1952, 1571, 2326, 2510, 1364, 2643, 4162, 1811, 1572, 4973, 5264, 5601, 5831, 949, 2646, 4164, 4316, 4974, 4975, 5832, 600, 799, 2864, 7043, 194, 2866, 2329, 2511, 2868, 2869, 3230, 3869, 7226, 5266, 4980, 4981, 5145, 5147, 4668, 4809, 4810, 2331, 6808, 7048, 5169, 2367, 2705, 1257, 6546, 1744, 3924, 4904, 1897, 3673, 3213, 2320, 2321]. **Floating** [2322, 2501, 2502, 1485, 5618, 997]. **floating-** [5412, 5934]. **Floating-Decimal** [134]. **Floating-Point** [2055, 7057, 3988, 2651, 4671, 4985, 5272, 5837, 5604, 4672, 7053, 7230, 4986, 3992, 6530, 7054, 6282, 4677, 5153, 6423, 6425, 6701, 7055, 5699, 5700, 5843, 5844, 5923, 6822, 4996, 3415, 3999, 4181, 4182, 4183, 1963, 4531, 2344, 4819, 6825, 2521, 3748, 5711, 862, 1016, 1097, 2063, 2671, 2887, 5283, 5503, 5713, 5928, 6084, 6085, 6086, 6430, 6828, 3423, 3424, 2066, 6087, 2523, 2067, 729, 2350, 5931, 6193, 1272, 1273, 1384, 4347, 6434, 6712, 7075, 3584, 6554, 5509, 247, 866, 5725, 3252, 3429, 5163, 6716, 2682, 1595, 5612, 2686, 3590, 4352, 5512, 5854, 6950, 1277, 6308]. **Floating-Point** [732, 1393, 1512, 1738, 2361, 3077, 4017, 6197, 4019, 1202, 1281, 1739, 5937, 3895, 4023, 5166, 5298, 5520, 5521, 2893, 4355, 3437, 3438, 3599, 2077, 6204, 6200, 4360, 6844, 2535, 2536, 6725, 4362, 4850, 618, 5943, 5944, 6096, 6849, 6969, 5306, 5174, 6571, 4373, 6971, 1979, 2081, 6206, 3907, 1745, 2907, 2909, 5433, 506, 6731, 4561, 5314, 5532, 3448, 4040, 4207, 1850, 6209, 2230, 1285, 6855, 6856, 1521, 6210, 4213, 7089, 2232, 6577, 5033, 5862, 1286, 2233, 2913, 6323, 4563, 5746, 3771, 1984, 5538, 879, 4052, 882, 1291, 6861, 2723, 2724, 4732, 5435, 5956, 6324, 6735]. **Floating-Point** [1410, 1621, 6736, 4382, 4571, 5543, 307, 2236, 2237, 2394, 1862, 4219, 7096, 5756, 6863, 4881, 971, 392, 393, 5326, 3917, 2556, 6866, 5629, 1989, 972, 6595, 2560, 2735, 2926, 6221, 6341, 1307, 5335, 5872, 3920, 1134, 6224, 1630, 6600, 1873, 1874, 1875, 2102, 2103, 6601, 7105, 5196, 5771, 6749, 3120, 3121, 4236, 343, 5631, 6126, 5961, 5557, 5777, 5779, 5962, 5964, 6345,

6476, 4398, 3925, 5558, 1225, 6231, 6349, 6755, 1639, 5967, 6232, 345, 1227, 1315, 1424, 2000, 2937, 3792, 3926, 3927, 4245, 4399, 4588, 4889, 4890, 5053, 5442, 5874, 4402, 3794, 744, 747, 7110, 5339, 1883, 2567, 6610]. **Floating-Point** [892, 1044, 3314, 5561, 7239, 829, 2429, 2945, 5344, 5345, 5878, 3801, 752, 753, 895, 1048, 5971, 3318, 6617, 6618, 6761, 6990, 6991, 6358, 6235, 6363, 6138, 5068, 2765, 6237, 4905, 5071, 6238, 6366, 6620, 5792, 5793, 1538, 441, 5353, 5354, 7119, 7121, 2122, 5213, 6042, 833, 906, 1439, 572, 5794, 6243, 3322, 2958, 2959, 2266, 2446, 6374, 2769, 7241, 4919, 2577, 6628, 641, 688, 2579, 5982, 6495, 1652, 2776, 7127, 5890, 6886, 4613, 527, 578, 1151, 3500, 5651, 4434, 7131, 7213, 984, 5572, 5363, 2454, 5574, 1776, 6248, 6640, 643, 1908, 2134, 2277, 2458, 2459, 3166, 5089, 5655]. **Floating-Point** [6250, 6499, 1154, 2788, 2465, 2466, 6501, 6642, 6775, 917, 5096, 5222, 5371, 2797, 4111, 3682, 3684, 3826, 2986, 5988, 2800, 2801, 5457, 7143, 2017, 646, 1332, 2595, 2283, 6781, 6055, 7148, 703, 4290, 6056, 2808, 2809, 3177, 6647, 5579, 4936, 5661, 5464, 5465, 6508, 2293, 2294, 1242, 3698, 923, 924, 6260, 2295, 995, 3183, 2296, 4639, 2297, 2820, 5106, 5473, 5474, 5664, 5996, 6784, 6513, 1692, 6401, 3964, 1555, 4127, 1463, 1788, 4947, 5110, 5381, 4472, 4787, 5111, 5818, 7159, 5113, 3007, 7164, 5674, 5907, 3710, 2483, 212, 3008, 2828, 3014, 3203, 3204, 3369, 3716, 3717, 2308, 6001, 6270]. **Floating-Point** [7030, 7170, 6167, 6168, 6659, 2034, 3019, 2623, 4952, 1468, 1469, 1798, 5585, 5123, 1173, 1348, 5910, 1799, 5587, 2492, 2629, 2630, 3026, 1475, 5588, 6794, 1802, 3546, 4960, 6170, 6672, 4154, 594, 3374, 6407, 6065, 7174, 5395, 2041, 850, 5589, 2845, 3547, 2847, 6796, 3377, 6408, 5912, 3862, 3218, 6276, 6521, 2321, 215, 1479, 1714, 2639, 5136, 5259, 5403, 5404, 5598, 5599, 5689, 1362, 2047, 7249, 3036, 216, 3226, 2324, 6278, 5262, 7225, 2647, 801, 3043, 1719, 5410, 4169, 6921, 6922, 6688, 5143, 5602, 5693, 5144, 5411, 5268, 6690, 5740, 5940, 4658, 6411, 4523, 7051, 4518, 2188, 2189, 417]. **Floating-point** [3240, 1961, 4331, 6544, 2348, 7066, 7067, 1590, 1591, 1731, 5288, 6551, 4832, 5008, 2525, 6436, 2689, 2690, 2691, 6019, 6089, 1511, 1837, 2221, 2078, 3758, 5304, 4714, 1402, 4723, 2546, 2390, 308, 3777, 5186, 1303, 5552, 1305, 3923, 7106, 4241, 4240, 4072, 3310, 258, 2944, 4594, 897, 6131, 6357, 4599, 4903, 6762, 2439, 6881, 6491, 1772, 3668, 981, 3152, 7000, 6380, 2274, 3947, 2135, 2592, 5659, 2021, 2022, 6262, 3963, 4302, 4951, 2165, 2485, 2312, 2039, 4305, 6271, 7173, 3859, 5396, 3215, 2849, 2850, 1078, 3726, 1358, 6520, 1481, 1482, 1483, 1484, 6008, 6802, 5619, 1951, 2190, 3402]. **floating-point** [2874, 3990, 1576, 6280, 5493, 6180, 722, 1495, 2656, 3053, 3407, 3408, 3409, 4522, 6424, 6535, 2515, 1088, 5701, 1813, 2334, 1814, 1815, 6184, 4179, 2884, 3061, 5608, 5926, 5927, 2341, 7061, 2665, 2342, 4337, 5278, 5279, 2201, 2345, 5849, 4822, 5159, 2347, 2205, 2668, 3069, 1826, 4342, 4825, 4826, 5160, 6017, 6299, 3749, 2206, 5285, 5610, 4345, 1017, 4830, 5420, 5611, 7069, 7070, 2207, 1018, 1197, 6433, 5853, 6713, 3251, 5009, 1275, 2209, 7190, 6555, 1385, 3428, 5010, 1597, 6437, 5013, 2072, 2688, 3890, 4543, 4013, 4016, 1601, 5519, 5733, 6198, 1975, 4022, 4706]. **floating-point** [5522, 7233, 2364, 2894, 2895, 2896, 4028, 6317, 5429, 5430, 2704, 6447, 5741, 3083, 4556, 4031, 3085, 249, 4856, 5173, 5303, 4370, 963, 4559, 5175, 5023, 2370, 4203, 2906, 5309, 504, 1746, 1747, 6029, 5311, 736, 1119, 4209, 6977, 1982,

1749, 1983, 821, 510, 5318, 1031, 6322, 2914, 2386, 4870, 6733, 4728, 4731, 4873, 3101, 623, 881, 1032, 1212, 1290, 1752, 3455, 2916, 3102, 1856, 5540, 1857, 2552, 1858, 5750, 4876, 4877, 6033, 6112, 6581, 7236, 7237, 1294, 252, 178, 1863, 4385, 4880, 6981, 6740, 6741, 5041, 3622, 5871, 4057, 4574, 4735, 6586, 2918, 2919, 3461, 3625]. **floating-point** [1415, 1217, 1988, 3462, 3287, 4582, 2557, 5331, 5332, 1757, 6469, 6599, 6747, 5764, 2100, 5765, 1219, 5767, 2407, 1222, 1876, 1759, 3637, 5195, 5197, 5553, 2242, 2243, 4067, 7238, 1136, 1223, 1879, 4742, 5960, 2930, 5775, 5776, 1636, 6035, 6229, 6346, 6347, 6475, 6036, 2248, 2417, 2418, 3127, 2108, 2109, 3478, 3643, 3644, 4244, 4246, 5633, 5781, 4744, 2939, 3308, 3480, 3309, 630, 475, 746, 2421, 2422, 2423, 2424, 4896, 6354, 2757, 2428, 2430, 2431, 1537, 1765, 5640, 6876, 3652, 3933, 4900, 5642, 3485, 831, 899, 975, 4256, 5972, 6133, 4902, 2573, 3319, 7116, 2262, 2263, 5974]. **floating-point** [6484, 6360, 3936, 3937, 5882, 6240, 757, 2764, 2952, 3141, 4601, 6139, 6040, 5978, 4906, 4426, 4607, 4609, 3940, 4907, 526, 573, 5646, 1770, 5357, 5647, 5980, 1650, 4264, 6044, 4909, 6627, 7242, 1053, 2009, 575, 642, 759, 760, 402, 690, 576, 6045, 4911, 2010, 2011, 1443, 6146, 2272, 2131, 2779, 5083, 5362, 1659, 1660, 697, 2585, 5802, 5893, 3502, 5364, 4918, 5085, 5366, 5367, 5368, 5452, 5573, 7003, 2586, 2013, 3946, 5088, 5454, 1907, 2276, 2457, 2460, 2785, 3676, 6050, 2978, 2979, 7137, 2463, 2464, 986, 4277, 4766, 2280, 3169, 6253, 3338, 3952, 7014, 4928, 5372, 5899, 6255, 482, 4279]. **floating-point** [3171, 5373, 5577, 5900, 987, 5808, 988, 3831, 4117, 7146, 4772, 4931, 5809, 2284, 702, 991, 2285, 2992, 3833, 7149, 2288, 2601, 3352, 2605, 2814, 2999, 4937, 4120, 6258, 1340, 5103, 6901, 1245, 1246, 1341, 708, 1065, 3001, 3356, 1689, 4943, 3525, 775, 5993, 5666, 5667, 5902, 6265, 5815, 3960, 1344, 4944, 4641, 1927, 5816, 5670, 999, 3002, 2479, 3962, 5671, 778, 2027, 2300, 4945, 6062, 711, 712, 3195, 3843, 4136, 4786, 5582, 3965, 4473, 4949, 4950, 3967, 3707, 2822, 2823, 3005, 3006, 3200, 2305, 3709, 3845, 4647, 2030, 3969, 4143, 4474, 6789, 3846, 3018, 2309, 1172, 2489, 2490]. **floating-point** [4475, 4476, 4651, 5388, 5389, 1797, 1470, 293, 1471, 2038, 4794, 4149, 376, 4796, 847, 2840, 2841, 3211, 5125, 147, 1474, 1800, 1944, 1948, 3027, 6405, 1709, 3373, 4486, 4961, 3375, 1354, 4311, 1804, 1710, 1950, 4158, 4312, 2043, 943, 6409, 4964, 4965, 717, 796, 2498, 2500, 4492, 4493, 5257, 1359, 2178, 2503, 851, 3983, 4803, 4970, 5258, 5405, 5829, 6277, 1808, 1716, 2323, 5137, 797, 2508, 1260, 295, 3227, 1952, 2326, 1364, 1811, 1572, 4973, 5264, 5601, 5831, 949, 2646, 4164, 4316, 4974, 4975, 5832, 2864, 7043, 2866, 2329, 2511, 2869, 3230, 3869, 7226, 5266, 4980, 4981, 5145, 5147]. **floating-point** [4810, 2331, 6808, 7048, 5169, 2705, 5618, 6546, 1744, 3924, 4904, 1897, 3213, 2320, 2321, 2322, 2501, 2502, 1485, 997]. **floating-point-number** [5819]. **Floating-point-Pegasus** [350]. **Floating-point-processing** [1622]. **Floating-Point-Roundoff** [454]. **Floating-Point-Routinen** [1744]. **Floating-Slash** [1141, 912, 1150, 2481]. **FLOATP_toolbox** [6769]. **Floats** [2197, 5504, 5778, 6613, 3978, 6394, 6404, 2813]. **FloatX** [6577]. **FLoC** [5663]. **Flocq** [5713, 6829]. **flop** [4274, 504, 6628]. **FloPoCo** [6773, 5618, 6568]. **FLOPS** [6449, 5653, 2981, 2656]. **FLOPS** [5653]. **Florian** [7145]. **Florida** [7518, 7616, 7645, 7430, 7380, 7562, 7383, 7625, 7642, 7327]. **flotante** [4624]. **flots** [2779]. **floissant** [2823, 5147].

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2031, 5821, 1699, 2828, 3014, 3203, 3204, 3205, 3369, 3716, 3717, 2308, 6001, 6270, 7030, 7170, 3370, 6167, 6168, 6659, 2034, 2035, 1702, 3019, 6002, 2623, 4952, 845, 1346, 1468, 1469, 1798, 5585, 3974, 3975, 5123, 1173, 1348, 4146, 5910, 3977, 1799, 5587, 2492, 2629, 2630, 3026, 5126, 5127, 1475, 5588, 6794, 1802, 5250, 5394, 6671, 3546, 4960]. **Point** [6170, 6672, 4154, 594, 3374, 4489, 6407, 6065, 7174, 6519, 1075, 5395, 2041, 850, 5589, 2845, 3547, 2847, 6796, 3377, 6408, 1357, 492, 5130, 5912, 6677, 3862, 3218, 6276, 6521, 2321, 3981, 6799, 215, 6416, 1479, 1714, 2639, 5136, 5259, 5403, 5404, 5598, 5599, 5686, 5689, 6523, 1568, 1362, 2047, 7249, 5830, 7177, 3035, 3036, 6007, 216, 3226, 2324, 6278, 4315, 6175, 1810, 4502, 5262, 7225, 2647, 801, 3043, 1719, 3558, 5410, 5833, 4169, 950, 1955, 6921, 6922, 6010, 6688, 5143, 5602, 5693, 5144, 5411, 5268, 6690, 5740, 5940, 6095, 6847, 4658, 6411, 4313, 2190, 4523, 3402, 5412, 664, 2874]. **point** [2652, 1957, 1958, 6526, 7051, 3990, 1576, 4518, 5696, 6280, 3047, 2188, 2189, 3737, 3874, 5492, 417, 5493, 3564, 6075, 6180, 6076, 722, 297, 1495, 2514, 2656, 3053, 3239, 3240, 3407, 3408, 3409, 3410, 4522, 6424, 6535, 6536, 7056, 2515, 1088, 1012, 1961, 2056, 5701, 1813, 2334, 1814, 1815, 1370, 2336, 1581, 1582, 2057, 2337, 4817, 6184, 4179, 4331, 1497, 2518, 2884, 3061, 5608, 5926, 2059, 1268, 1376, 1820, 2199, 2519, 2200, 1822, 5927, 4334, 2061, 2341, 7061, 2665, 3246, 3063, 2342, 4337, 5278, 5279, 1094, 2201, 1378, 7186, 2345, 5849, 4822, 2520, 1194]. **point** [5159, 3884, 2204, 2346, 6297, 6544, 2347, 2205, 2348, 2668, 2669, 3069, 1826, 4342, 4537, 4688, 4825, 4826, 4827, 5160, 5282, 6017, 6299, 7066, 3749, 7067, 1590, 1591, 1729, 300, 2206, 1731, 668, 5285, 5610, 4345, 3885, 1017, 4830, 5288, 5420, 5611, 7069, 7070, 7188, 2207, 1018, 1197, 6551, 4832, 5008, 6433, 5853, 6713, 3251, 5009, 3585, 1275, 2525, 1828, 4833, 2209, 2678, 7190, 6435, 6436, 1968, 6555, 1385, 6556, 3428, 6306, 1386, 4837, 5010, 2684, 3253, 380, 1597, 2685, 6437, 3888, 5013, 1831, 2072, 2688, 3755, 3890, 5934, 1388, 1735, 2219, 2689, 2690, 2691, 6019, 6089]. **point** [2357, 3074, 4543, 5517, 4012, 3075, 4013, 6020, 4839, 4840, 4016, 1511, 1601, 1837, 2221, 5519, 5733, 6198, 4196, 2697, 1107, 1975, 4022, 4706, 4550, 422, 2078, 5522, 3439, 5735, 7233, 3758, 2364, 2894, 2895, 2896, 3898, 4028, 3262, 6316, 2702, 6317, 5429, 5430, 961, 1283, 2704, 6447, 6023, 5741, 3083, 2902, 3266, 3443, 4556, 4711, 4852, 6202, 7193, 6098, 4031, 3085, 249, 4856, 5173, 5303, 5304, 4370, 4714, 963, 4559, 5620, 6728, 5175, 2538, 5308, 2539, 5023, 2370, 4203, 2906, 5309, 2224, 504, 1746, 1747, 1845, 2908, 6029, 4034, 1206, 1402, 5311, 5176, 5530, 736, 1119, 5029, 4208]. **point** [4209, 6977, 4721, 4722, 5623, 4723, 1522, 1982, 2382, 1749, 4724, 1983, 737, 821, 510, 823, 3769, 6732, 7091, 7196, 1208, 5318, 1031, 2089, 6322, 2914, 2386, 4870, 2546, 6733, 4728, 5865, 4729, 283, 3100, 3278, 4731, 4873, 5866, 3101, 2548, 623, 881, 1032, 1212, 1290, 1752, 3455, 2390, 2916, 3102, 1033, 2725, 1856, 5540, 969, 1857, 2552, 1858, 5750, 2392, 4876, 4877, 1859, 5436, 6033, 6112, 6581, 7236, 7237, 1294, 1622, 2393, 252, 178, 308, 2729, 3914, 2397, 1863, 4385, 4880, 3915, 2554, 6981, 4055, 6740, 6741, 3104, 4056, 3777, 5041, 3622, 5871, 7098, 4057]. **point** [4574, 4735, 6585, 6586, 3782, 5186, 2918, 2919, 3282, 3624, 4226, 6464, 1038, 3107, 3461, 3625, 1298, 1415, 5046, 1217, 1988, 3627, 2238, 3462, 1416, 1303, 3287, 3114, 5959, 4063, 2239, 3467, 5552, 4582, 2924, 2557, 3115, 1305,

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[4666]. **Ultraefficient** [6921]. **ultrasonic** [2354, 2528]. **ultrasonics** [1794]. **UltraSPARC** [3456]. **ultrawide** [4164]. **UMFS** [485]. **Umwandlung** [2016]. **un-normalized** [478]. **Unabridged** [5923]. **Unambiguous** [5468]. **Unary** [5973, 1914, 7026]. **Unbalanced** [5710, 5691]. **Unbiased** [5304, 6372, 6521, 4856, 3214]. **Unbiasedness** [6950]. **Uncertain** [5558, 6279]. **Uncertainty** [3708, 6686, 5290]. **Unconstrained** [4617, 6322]. **Uncoupled** [6804]. **Uncovered** [5567]. **Undebuggability** [5874]. **Undebuggable** [5442]. **Undefined** [5915]. **Under-** [6537]. **under/overflow** [5352]. **Underflow** [4987, 1396, 4027, 1400, 1742, 1124, 1287, 1035, 1292, 2090, 345, 5051, 1444, 1911, 6175, 1982, 3609, 5178, 1438, 3148, 4958]. **Underflow-Free** [3043, 1443, 2864]. **underflow-induced** [3148]. **underflowing** [4688, 5734]. **underflows** [1130]. **Understand** [6573]. **Understandable** [936]. **Understanding** [6099]. **uneven** [4455]. **Ungleichun** [549]. **UniCalc** [3690]. **Unicode** [5571]. **Unidirectional** [5017, 945, 4707]. **Unified** [5606, 1087, 4177, 5713, 6961, 738, 4384, 5045, 7099, 7202, 5555, 1140, 894, 1046, 1662, 3351, 995, 4468, 6278, 4685, 3254, 3431, 6841, 3281, 2248, 2417, 2418, 1065, 1359, 661, 6632, 930]. **unifies** [3673]. **Uniform** [2068, 1108, 819, 4031, 4390, 6053, 699]. **Uniformly** [2344, 851]. **Unifying** [4870, 2596, 5227]. **Unit** [7051, 6929, 4338, 6945, 6544, 5711, 2066, 3071, 6712, 6947, 4350, 6715, 2214, 3590, 4352, 6439, 6952, 1394, 1602, 4017, 6961, 277, 5018, 5526, 3093, 5622, 6976, 432, 5746, 1984, 4052, 1409, 1410, 390, 5628, 5335, 5765, 5872, 519, 3120, 3121, 4236, 4174, 3473, 4072, 2567, 5561, 1046, 1433, 1766, 2116, 4899, 903, 5348, 5564, 3321, 5353, 5354, 5355, 7122, 5888, 6628, 7125, 5982, 2271, 403, 2584, 5089, 4441, 5805, 6775, 6777, 6778, 5099, 6781, 6055, 5996, 4127, 1463, 4135, 4788, 6654, 7027, 7161, 5821, 6001, 6270, 935, 3374, 5395, 5397, 6416, 149, 5403, 5914, 6008, 6689, 6805, 2186, 664, 7050]. **unit** [417, 3877, 1814, 1815, 4817, 2518, 2665, 2342, 4349, 4833, 5013, 611, 4543, 5517, 3075, 4857, 4731, 4873, 5866, 3101, 1858, 1622, 5046, 3287, 2557, 3115, 1870, 4067, 4585, 4587, 3640, 2421, 2422, 3311, 2256, 1646, 2259, 4900, 2948, 4901, 4902, 4088, 3141, 3142, 6491, 4907, 1321, 5981, 3815, 2273, 3160, 697, 2586, 2974, 3328, 7215, 3337, 3171, 3172, 839, 840, 994, 3001, 2025, 6263, 3526, 5670, 4945, 3843, 4136, 2824, 5243, 5245, 5387, 1474, 3375, 2494, 1355, 5591, 5832, 930]. **Unit-ALU** [5821]. **Unitary** [3285]. **United** [7498, 7395, 7703, 7316]. **Units** [5699, 5700, 5843, 5844, 547, 7075, 3893, 7078, 3768, 5533, 1403, 1617, 6458, 825, 1293, 6863, 6592, 6593, 6751, 3925, 4596, 1892, 233, 287, 5794, 4273, 914, 144, 6890, 7133, 7134, 6252, 3680, 3827, 2145, 5230, 5579, 4633, 370, 4639, 322, 5817, 6267, 4784, 4302, 6271, 457, 5260, 5262, 4163, 1005, 5833, 1489, 5940, 5492, 5499, 2204, 4008, 6023, 4370, 5175, 4208, 3276, 6031, 3104, 5630, 6750, 2753, 3938, 4097, 5083, 3330, 4928, 4282, 6059, 5816, 3367, 1001]. **unity** [2980]. **Univariate** [6244, 5447]. **univariées** [5447]. **Universal** [6535, 4324, 548, 873, 1750, 6105, 1296, 3776, 1626, 6587, 4237, 6473, 6492, 6622, 6994, 7015, 5808, 4938, 1549]. **Universe** [6574]. **Universeller** [1549]. **Universitat** [1664, 7341, 7318, 7326]. **University** [7418, 7256, 4175, 4176, 723, 7633, 7506, 7344, 7351, 7655, 7395, 7293, 7315, 7320, 7333, 7509, 7522, 7578, 7381, 7366, 7300, 7454, 7353, 7301, 4947, 7326, 7582, 108, 7295, 7297, 7542, 7356, 7290, 485, 3719]. **UNIX**

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1. Table 5 (page 124):

insert `k <-- 0` after assertion, and also delete `k <-- 0` from Table 6.

2. Table 9 (page 125):

```
for      -1:USER!("");
substitute -1:USER!("0");
and delete the comment.
```

3. Table 10 (page 125):

```
for      fill(-k, "0")
substitute fill(-k-1, "0")
```

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- branch and bound algorithms for global optimization,
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- solution sets of linear systems,
- hardware and software systems for interval computations, and
- fuzzy logic.

Actual applications described in the book include:

- economic input-output models,
- quality control in manufacturing design,
- a computer-assisted proof in quantum mechanics,
- medical expert systems,
- and others.

A realistic view of interval computations is taken: the articles indicate when and how overestimation and other challenges can be overcome. An introductory chapter explains the content of the papers in terminology accessible to mathematically literate graduate students. The style of the individual, refereed contributions has been made uniform and understandable, and there is an extensive book-wide index. Audience: Valuable to students and researchers interested in automatic result verification. Detailed information, including contents, contributors, and an order form can be found:

- on Kluwer homepage <http://www.wkap.nl>, or
- on the Interval Computations homepage <http://cs.utep.edu/interval-comp/main.html>, in the “Books” section.

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Industry immediately started to investigate the failure.” From the report: “The internal SRI software exception was caused during execution of a data conversion from 64-bit floating point to 16-bit signed integer value. The floating point number which was converted had a value greater than what could be represented by a 16-bit signed integer. This resulted in an Operand Error. The data conversion instructions (in Ada code) were not protected from causing an Operand Error, although other conversions of comparable variables in the same place in the code were protected.”.

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result. Interval arithmetic is an improvement on this, but still not an ideal solution because if the final interval is larger than desired, there is no simple way to restart the computation at higher precision. By contrast, in XR no precision level is set in advance, and no computation takes place until a final request takes place for some output. Despite this, programming with XR is no different from MPFP, except for the declaration of critical variables as type ‘XR’.

The main aim is to produce a usable efficient implementation, which can be easily interfaced with existing C++ code. This contrasts with previous implementations in functional languages (Haskell, Miranda etc.), which, although theoretically important, seem to be rather too slow for real use.

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- branch and bound algorithms for global optimization,
- constraint propagation,
- solution sets of linear systems,
- hardware and software systems for interval computations, and
- fuzzy logic.

Actual applications described in the book include:

- economic input-output models,
- quality control in manufacturing design,
- a computer-assisted proof in quantum mechanics,
- medical expert systems,
- and others.

A realistic view of interval computations is taken: the articles indicate when and how overestimation and other challenges can be overcome. An introductory chapter explains the content of the papers in terminology accessible to mathematically literate graduate students. The style of the individual, refereed contributions has been made uniform and understandable, and there is an extensive book-wide index. Audience: Valuable to students and researchers interested in automatic result verification. Detailed information, including contents, contributors, and an order form can be found:

- on Kluwer homepage <http://www.wkap.nl>, or
- on the Interval Computations homepage <http://cs.utep.edu/interval-comp/main.html>, in the “Books” section.

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