

Blog Entry © Saturday, October 26, 2024, by James Pate Williams, Jr. Translation of FORTRAN Subroutines from ***Elementary Numerical Analysis an Algorithmic Approach Third Edition*** © 1980 by S. D. Conte and Carl de Boor Chapter Two Interpolation by Polynomials

Interpolation $f(x) = (1 + x^2)^{-1}$ Program for Example 2.4 Divergent Interpolation

n	Maximum Error
2	6.461538e-01
4	4.381339e-01
6	6.166676e-01
8	1.045174e+00
10	1.915643e+00
12	3.605274e+00
14	7.192008e+00
16	1.405154e+01

Interpolation in a function table $f(x) = x * \ln(x)$ $x = 0.55$

		f(0.55)	Error
2	5.000000e-01	-3.064954e-01	-2.003911e-02
3	4.000000e-01	-3.265345e-01	-2.516939e-03
4	7.000000e-01	-3.290514e-01	2.119260e-04
5	3.000000e-01	-3.288395e-01	4.080057e-05
6	8.000000e-01	-3.287987e-01	-8.906244e-06
7	9.000000e-01	-3.288076e-01	-1.890708e-06
8	2.000000e-01	-3.288095e-01	-1.691827e-06
9	1.000000e+00	-3.288112e-01	5.060453e-07
10	1.000000e-01	-3.288107e-01	1.049005e-06
11	1.100000e+00	-3.288096e-01	-3.903909e-07
12	1.200000e+00	-3.288100e-01	-1.647981e-07
13	1.300000e+00	-3.288102e-01	-7.663572e-08
14	1.400000e+00	-3.288103e-01	-3.848509e-08
15	1.500000e+00	-3.288103e-01	-2.057585e-08
16	1.600000e+00	-3.288103e-01	-1.158892e-08
17	1.700000e+00	-3.288103e-01	-6.820987e-09

Newton form interpolating polynomials $f(x) = x * \sin(x)$, degree, x, f(x)

1	5.000000e-02	2.498958e-03
2	1.000000e-01	9.983342e-03
3	1.500000e-01	2.241572e-02
4	2.000000e-01	3.973387e-02
5	2.500000e-01	6.185099e-02
6	3.000000e-01	8.865606e-02
7	3.500000e-01	1.200142e-01
8	4.000000e-01	1.557673e-01

Cramer's Rule for 2x2 and 3x3 matrices (determinants, matrix, inverse, and matrix times inverse which is the identity matrix)

seed = 2

det 2x2 = -23

det 3x3 = -176

5.000000	6.000000
8.000000	5.000000

-0.217391	0.260870
0.347826	-0.217391

1.000000	0.000000
0.000000	1.000000

4.000000	0.000000	0.000000
1.000000	5.000000	6.000000
7.000000	9.000000	2.000000

0.250000	0.000000	-0.000000
-0.227273	-0.045455	0.136364
0.147727	0.204545	-0.113636

1.000000	0.000000	0.000000
0.000000	1.000000	0.000000
0.000000	0.000000	1.000000