

Robert M. Corless

Editor-in-Chief, Maple Transactions
Western University
London, CANADA N6A 5B9

Email: Rob.Corless@gmail.com, URL: <https://rcorless.github.io/>
TWITTER: @corless_rob, YOUTUBE Robert M. Corless

Born: Prince George British Columbia
Nationality: Canadian

Current position

Editor-in-Chief, [Maple Transactions](#)
Emeritus Distinguished University Professor, Western University
Adjunct Professor, Cheriton School of Computer Science, University of Waterloo
Member The Rotman Institute of Philosophy, Western University
Member The Ontario Research Centre for Computer Algebra

Areas of specialisation/interest

Areas of specialisation: Computational linear and polynomial algebra; computational dynamical systems; computational special functions. Areas of interest: Computational Discovery and Computational Epistemology (that is, how we can use computers to learn new things, and how we can increase our confidence that those new things are true); The Ethics of AI, especially in teaching.

Appointments held

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|-----------|---|
| 2006–2019 | Distinguished University Professor, Applied Mathematics, Western University |
| 1998–2006 | Professor, Applied Mathematics, Western University |
| 1993–1998 | Associate Professor, Applied Mathematics, Western University |
| 1987–1993 | Assistant Professor, Applied Mathematics, Western University |

Education

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|------|---|
| 1987 | PHD in Mechanical Engineering, University of British Columbia |
| 1982 | M.MATH in Applied Mathematics, University of Waterloo |
| 1980 | B.Sc in Math and Computer Science, University of British Columbia |

Grants, honours & awards

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| 1988–2025 | NSERC \$1,180,000 cumulative Discovery Grants |
| 2021–2024 | MICINN €114,334 co-investigator with Sonia Pérez-Díaz and Laureano González-Vega, PIs |
| 2020 | MITACS \$49,000 co-investigator with Marc Moreno Maza PI |
| 2018–2021 | SSHRC \$77,000 co-investigator with Nic Fillion PI |
| 2003–2007 | MITACS \$250,000 co-investigator with Stephen Watt PI |
| 1999–2003 | ORDCF \$514,000 co-investigator with Stephen Watt PI |
| 1999–2003 | NSERC CRD \$514,000 co-investigator with Stephen Watt PI |
| 1987–present | Various small grants, over \$120,000 cumulative |
| | |
| 2019 | Visiting Fellow, Program CAT, Isaac Newton Institute, Cambridge |
| 2019 | Fellowship Giner de los Rios, Universidad de Alcalá |
| 2017 | Fellowship Giner de los Rios, Universidad de Alcalá |
| 2012 | Visiting Fellow, University of Otago, Dunedin, NZ |
| 2011 | Visiting Fellow, John Curtin School of Medical Research, ANU, Canberra, Australia |
| 2007–2008 | Visiting Fellow, John Curtin School of Medical Research, ANU, Canberra, Australia |
| 1995 | Visiting Fellow, Center for Experimental and Computational Mathematics, SFU, Vancouver, Canada |
| 1994 | Visiting Fellow, IBM T.J. Watson Research Center, Yorktown Heights, NY, USA |
| | |
| 2019 | Paul Halmos/Lester Ford award from the Mathematical Association of America |
| 2018 | Teaching Fellowship: Computational Discovery on Jupyter |
| 2017 | Pi Mu Epsilon Fraternity lecturer University of Western Michigan |
| 2004 | NSERC SYNERGY Award |
| 2003 | Mapstone Lecturer, SUNY Geneseo |

Publications & talks

JOURNAL ARTICLES

105. R. M. Corless & Leili Rafiee Sevyeri, “[Compact Cubic Splines](#)”, Journal of Approximation Theory. 283 2022. This is a shortened and revised version of <https://arxiv.org/abs/1805.07659> (2018)
104. Eunice Y.S. Chan and R. M. Corless, “Chaos Game Representation”, accepted 22.02.2022 to SIAM Review, [arXiv preprint](#).
103. Eunice Y. S. Chan, R. M. Corless, Laureano González-Vega, J. Rafael Sendra, Juana Sendra, “[Inner Bohemian inverses](#),” Appl. Math. & Comp. 421 2022.
102. Fahimeh Rezaei, Mahmoud Hadizadeh, R. M. Corless, and Amirhossein Amiraslani, “[Structural Analysis of Matrix Integration Operators in Polynomial Bases](#)”, Banach Journal of Mathematical Analysis 16:5 22 pages (2021).
101. Eunice Y.S. Chan, R. M. Corless, and Leili Rafiee Sevyeri, “[Generalized Standard Triples](#)”, Electronic Journal of Linear Algebra Vol 37. September (2021) pp 640–658.

100. C. Brimacombe, R. M. Corless, & M. Zamir, “[Computation and applications of the Mathieu Functions: A historical perspective](#),” SIAM Review, 63 (4) pp 653–720 (2021).
99. Neil J. Calkin, Eunice Y.S. Chan, R. M. Corless, David J. Jeffrey, and Piers W. Lawrence, “A Fractal Eigenvector”. [American Mathematical Monthly](#) 129 6 (2022) pp 503–523. arXiv preprint
98. R. M. Corless [Sobre La Iteración Cúbica Inversa](#), La Gaceta de la RSME, 24 1 (2021) 147–159.
97. R. M. Corless, D.J. Jeffrey, & D.R. Stoutemyer, [Integrals of Functions Containing Parameters](#), Mathematical Gazette, vol. 104, no. 561, 2020, pp. 412–426.
96. Eunice Y.S. Chan, R. M. Corless, L. González-Vega, J. Rafael Sendra, Juana Sendra, and Steven E. Thornton, [Bohemian Upper Hessenberg and Toeplitz Matrices](#), Lin. Alg. Appl., Volume 601, pp 72–100 (2020).
95. Robert H. C. Moir, R. M. Corless, David J. Jeffrey, [An Unwinding Number Pair for Continuous Expressions of Integrals](#), J. Symbolic Computation 105 pp 97–113 (2020).
94. R. M. Corless and Leili Rafiee Sevyeri, [The Runge Example for Interpolation and Wilkinson’s Examples for Rootfinding](#) SIAM Review 62.1 (2020): 231–243.
93. R.H.C. Moir, R. M. Corless, M. Moreno Maza, and N. Xie, [Symbolic-Numeric Integration of Rational Functions](#) Numerical Algorithms 83 1295–1320, (2020)
92. N. Fillion and R. M. Corless, [Concepts of Solution and the Finite Element Method: a Philosophical Take on Variational Crimes](#). Philos. Technol. 1–20 (2019).
91. A. Amiraslani, R. M. Corless and M. Gunasingham, [Differentiation Matrices for Univariate Polynomials](#) Numerical Algorithms, 83 1–31, (2020).
90. R. M. Corless, M. Moreno Maza, and S.E. Thornton, “Comprehensive Rank Computation for Matrices Depending on Parameters.” Accepted 2019 to Comm. on Comp. Algebra.
89. Ao Li and R. M. Corless [Revisiting Gilbert Strang’s “A Chaotic Search for \$i\$ ”](#), ACM Communications on Computer Algebra. 53 (1) pp 1–22 (2019)
88. R. M. Corless and Leili Rafiee Sevyeri, [Stirling’s Original Asymptotic Series from a Formula like one of Binet’s and its Evaluation by Sequence Acceleration](#), Experimental Mathematics, April 2019, pp 1–8.
87. Eunice Y.S. Chan, R. M. Corless, L. González-Vega, J. Rafael Sendra and Juana Sendra, [Algebraic Linearizations of Matrix Polynomials](#), Lin. Alg. Appl., 563: 373–399, (2019)
86. R. M. Corless, C. Y. Kaya and R.H.C. Moir, [Optimal Residuals and the Dahlquist Test Problem](#) Numerical Algorithms, 1–22, 2018.
85. R. M. Corless and Julia E. Jankowski, [Revisiting the Discharge Time of a Cylindrical Leaking Bucket](#) ACM Communications in Computer Algebra 52 (1) 1–10 (2018).
84. Eunice Y.S. Chan and R. M. Corless, [Minimal Height Companion Matrices for Euclid Polynomials](#) Math. in Comp Sci 13 pp 1–16 (2018).
83. J. M. Borwein and R. M. Corless, [Gamma and Factorial in the Monthly](#), American Mathematical Monthly 125 (4), 400–424 (2018)
82. Eunice Y.S. Chan and R. M. Corless, [A new kind of companion matrix](#) The Electronic Journal of Linear Algebra, 32 pp 335–342 (2017)
81. R. M. Corless and Julia E. Jankowski, [Variations on a Theme of Euler](#) SIAM Review, 58 (4), 775–792, 2016.
80. P.W. Lawrence and R. M. Corless, [Backward Error of Polynomial Eigenvalue Problems Solved by Linearization of Lagrange Interpolants](#) SIMAX., 36(4), 1425–1442. (October 2015)

79. D.A. Aruliah, R. M. Corless, G.M. Diaz-Toca, L. González-Vega, A. Shakoori, [The Bézout matrix for Hermite interpolants](#) Linear Algebra and its Applications. Vol 474, 12–29, 2015.
78. R. M. Corless, M.M. Maza, and S.E. Thornton, “Zigzag Form of Families of Parametric Matrices,” ACM Communications in Computer Algebra. Vol 48:3, 109–112, 2015
77. T.D. Lamb, R. M. Corless, and A.D. Pananos, [The kinetics of regeneration of rhodopsin under enzyme-limited availability of 11-cis retinoid](#) Vision Research. Vol 110, 23–33, 2015.
76. Y. Zhang and R. M. Corless, [High-Accuracy Series Solution for Two-Dimensional Convection in a Horizontal Concentric Cylinder](#) SIAM J. Appl. Math. vol 74, no. 3 (2014): 599–617.
75. R. M. Corless, J. Hu , and D.J. Jeffrey, [On some definite integrals containing the Tree \$T\$ Function](#) ACM Communications in Computer Algebra. Vol 48:2, 33–41, 2014.
74. P.W. Lawrence and R. M. Corless, [Stability of Rootfinding for Barycentric Lagrange Interpolants](#) Numerical Algorithms. vol 65 (3) (March 2014) 447–464
73. N. Fillion and R. M. Corless, “On the epistemological analysis of modeling and computational error in the mathematical sciences,” Synthèse, 191 (May 2014): 1451–1467
72. R. M. Corless, “Pseudospectra for Exponential Matrix Polynomials,” Theoretical Computer Science, Volume 479 (April 2013) 70–80.
71. C. Chen, R. M. Corless, M. Moreno Maza, P. Yu, and Y. Zhang, “An Application of Regular Chain Theory to the Study of Limit Cycles” Int. J. Bifurcations and Chaos. Volume 23, Issue 9 (September 2013) 21 pages.
70. R. M. Corless, G.M. Diaz-Toca, M. Fioravanti, L. González-Vega, I.F. Rua, and A. Shakoori, “Computing the topology of a real algebraic plane curve whose defining equations are available only ‘by values’,” Computer Aided Geometric Design, 30 (7) (Oct 2013) 675–706
69. G.A. Kalugin, D.J. Jeffrey, R. M. Corless, “Bernstein, Pick, Poisson and related integral expressions for Lambert W,” Integral Transforms and Special Functions. Volume 23, Issue 11 (2012) 817–829.
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67. G.A. Kalugin, D.J. Jeffrey, R. M. Corless and P.B. Borwein, “Stieltjes and other integral representations for functions of Lambert W,” Integral Transforms and Special Functions, 23 (8) 581–593 (2012).
66. R. M. Corless, E. Postma, and D.R. Stoutemyer. 2011. “Rounding coefficients and artificially underflowing terms in non-numeric expressions,” ACM Commun. Comput. Algebra 45, 1/2 (July 2011) 17–48
65. J.C. Butcher, R. M. Corless, L. González-Vega and A. Shakoori, “Polynomial Algebra for Birkhoff Interpolants,” Numerical Algorithms, Volume 56, Issue 3 (March 2011) 319–347.
64. P. Yu and R. M. Corless, “Symbolic computation of limit cycles associated with Hilbert’s 16th problem,” Comm. Nonlin. Science and Numerical Simulation, Vol 14, (2009), 4041–4056
63. R. M. Corless, K. Gatermann, & I.S. Kotsireas, “Using symmetries in the eigenvalue method for polynomial systems,” Special Issue of the Journal of Symbolic Computation (Chemistry and Biological Applications) in honour of Karin Gatermann 44:1,(2009) 1536–1550.
62. A. Amiraslani, P. Lancaster & R. M. Corless, “Linearization of matrix polynomials expressed in polynomial bases,” IMA Journal of Numerical Analysis Vol 29, No. 1, (2009) 141–157

61. S. Brennan & R. M. Corless, "Creating a Warmer Environment for Women in the Mathematical Sciences and in Philosophy," *Atlantis*, Vol 33(2) (2009) 54-61.
60. R. M. Corless, A. Shakoori, D.A. Aruliah, & L. González-Vega, "Barycentric Hermite Interpolants for Event Location in Initial-Value Problems," *Journal of Numerical Analysis, Industrial and Applied Mathematics*, Vol. 3, no. 1-2 (2008) 1-16
59. M. Bronstein, R. M. Corless, J.H. Davenport & D.J. Jeffrey, [Algebraic Properties of the Lambert W Function](#) *Integral Transforms & Special Functions*, Vol. 19 (10) (2008) 709-712.
58. R. M. Corless & S. Ilie, "Polynomial cost for solving IVP for high-index DAE," *BIT Numerical Mathematics*, (2008) 48: 29-49.
57. G. Söderlind, S. Ilie & R. M. Corless, "Adaptivity and Computational Complexity in the Numerical Solution of ODEs," *Journal of Complexity*, 24 3 (2008) 341-361
56. S. Ilie, R. M. Corless & G.C. Essex, "The computational complexity of extrapolation methods," *Mathematics in Computer Science* (2008) 557-566
55. A. Amiraslani, D.A. Aruliah and R. M. Corless, "Block LU Factors of Generalized Companion Matrix Pencils," *Theoretical Computer Science* 381.1-3 (2007) 134-147
54. R. M. Corless, N. Rezvani, & A. Amiraslani, "Pseudospectra of matrix polynomials expressed in alternative bases," *Mathematics and Computer Science*, 1 (2007) 353-374
53. G.C. Essex, S. Ilie, and R. M. Corless, Broken symmetry and long-term forecasting. *Journal of Geophysical Research: Atmospheres*, 112(D24), 2007.
52. J. Zhao, M. Davison & R. M. Corless, "Compact Finite Difference Method for American Option Pricing," *Journal of Computational and Applied Mathematics* 26(1)(2007) 306-321
51. R. M. Corless, On a generalized companion matrix pencil for matrix polynomials expressed in the Lagrange basis. In Dongming Wang and Lihong Zhi, editors, *Symbolic-Numeric Computation*, pages 1-15. Birkhäuser Basel, 2007.
50. J. Zhao, R. M. Corless & M. Davison "Financial Applications of Symbolically Generated Compact Finite Difference Formulae," Financial applications of symbolically generated compact finite difference formulae. In Dongming Wang and Lihong Zhi, editors, *Symbolic-Numeric Computation*, pages 361-374. Birkhäuser, Basel, 2007.
49. S. Ilie, R. M. Corless & G. J. Reid, "Numerical solutions of index-1 differential algebraic equations can be computed in polynomial time" *Numer. Algorithms* 41, (2006) 161-171
48. J. Zhao & R. M. Corless, "Compact Finite Difference Method for Integro-Differential Equations," *Appl. Math. Comput.* 177, No. 1, (2006) 271-288.
47. J. Zhao, T. Zhang, & R. M. Corless, "Convergence of compact finite difference methods for second-order elliptic equations," *Appl. Math. Comput.* 182, No. 2, (2006) 1454-1469.
46. J. M. Heffernan & R. M. Corless, "Solving some delay differential equations with computer algebra," *The Mathematical Scientist*, 31, no. 1, (2006) 21-34.
45. N. Rezvani & R. M. Corless, "The nearest polynomial with a given zero, revisited," *SIGSAM Bulletin, Communications in Computer Algebra*, 39, no. 3 (September 2005) 73-79.
44. M. Benghorbal & R. M. Corless, "A unified formula for arbitrary order symbolic derivatives and integrals of a rational polynomial," *Int. Journal of Pure and Applied Mathematics*, 16, no. 2 (2004) 193-201.
43. M. Benghorbal & R. M. Corless, "Power series solutions of fractional differential equations," *Int. Journal of Pure and Applied Mathematics*, 15, no. 3 (2004) 333-352.

42. R. M. Corless, S.M. Watt & L. Zhi, "QR Factoring to compute the GCD of univariate approximate polynomials," *IEEE Trans. Sig. Proc.*, 52, no. 12, (December 2004) 3394-3402.
41. R. M. Corless, L. González-Vega, I. Necula, A. Shakoori, "Topology Determination of Implicitly Defined Real Algebraic Plane Curves," *An. Univ. Timisoara Ser. mat.-Inform.*, 41 (Special Issue): (2003) 83-96.
40. R.J. Bradford, R. M. Corless, J.H.Davenport, D.J.Jeffrey, & S.M. Watt: "Reasoning about the elementary functions of complex analysis," *Ann. Maths Art. Intel.*, 36, (2002) 303-318.
39. R. M. Corless, "A new view of the computational complexity of initial value problems for ordinary differential equations," *Numerical Algorithms*, 31 (2002) 115-124.
38. E. Kaltofen, with R. M. Corless & D.J. Jeffrey, "Challenges in symbolic computation: My favourite open problems," 29, 6 *Journal of Symbolic Computation*, July (2000) 891-919.
37. S.R. Valluri, R. M. Corless, & D.J. Jeffrey, "Some applications of the Lambert W function to physics", 78, *Canadian J. of Physics* (2000) 823-831.
36. L.F. Shampine & R. M. Corless, "Initial value problems for ODEs in problem solving environments," *J. Computational and Applied Mathematics*, 125 (2000) 31-40.
35. J.M. Borwein & R. M. Corless, "Emerging tools in experimental mathematics," *American Mathematical Monthly*, vol. 106, (December 1999) 889-909.
34. E. Katende, A. Jutan & R. M. Corless, "Quadratic nonlinear predictive control," *Industrial and Engineering Chemistry Research*, 37 (1998) 2721-2728.
33. R. M. Corless, "Variations on a theme of Newton," *Math Mag*, 71 (Feb 1998) 34-41.
32. D.J. Jeffrey, D.E.G. Hare, & R. M. Corless, "Exact rational solutions of a transcendental equation," *Comptes Rendus (Mathematics)*, vol 20, 3 (1998) 71-76.
31. H.B. Bauschke & R. M. Corless, "Analyzing a projection method with Maple," *Maple Tech* (special issue Maple in the Mathematical Sciences), vol 4, no. 1 (1997) 2-7.
30. R. M. Corless & D.J. Jeffrey, "Scientific computing: One part of the revolution," special issue *J. of Symbolic Computation* 23 (1997) 485-495.
29. R. M. Corless, D.J. Jeffrey, Pratibha & M.B. Monagan, "Two perturbation calculations in fluid mechanics using large expression management," *J. Symb Comp*, 23 (1997) 427-443.
28. J.M. Borwein, P.B. Borwein, S. Braham, R. M. Corless, & L. Jorgenson, "Digitally activated mathematics for a brave new world wide web," *Ed. Res. & Persp*, 23, no. 2 (1996) 28-47.
27. R. M. Corless, G.H. Gonnet, D.E.G. Hare, D.J. Jeffrey & D.E. Knuth, "On the Lambert W function", *Advances in Computational Mathematics* 5 (1996) 329-359.
26. D.J. Jeffrey, D.E.G. Hare & R. M. Corless, "Unwinding the branches of the Lambert W Function," *Mathematical Scientist*, 21, (1996) 1-7.
25. D.J. Jeffrey, R. M. Corless, D.E.G. Hare & D.E. Knuth, "Sur l'inversion de $y^\alpha e^y$ au moyen des nombres de Stirling associés," *Comptes Rendus de L'Académie des Sciences, Paris*, 320, 1, 12 (1995) 1449-1452.
24. R. M. Corless & S. Yu Pilyugin, "Approximate and real trajectories for generic dynamical systems," *J. Mathematical Analysis & Applications*, 189 (1995) 409-423.
23. R. M. Corless, "Bifurcation in a flow-induced vibration model," *American Math Society; Fields Institute Communications*, vol. 4 (1995) 43-59.
22. R. M. Corless & S. Yu Pilyugin, "Evaluation of upper Lyapunov exponents on hyperbolic sets," *Journal of Mathematical Analysis and Applications* 189 (1995) 145-159.

21. R. M. Corless, "Symbolic computation in nonlinear dynamics," *Open Systems & Information Dynamics* 3,1 (1995) 131-147.
20. R. M. Corless & M.B. Monagan, "Simplification and the assume facility", *MapleTech* (1994) 24-31.
19. T. Scott, B. Madore & R. M. Corless, "Maple in Science education," *Special Issue of MapleTech* (1994) 58-68.
18. T. Scott, G. Fee, R. M. Corless & M.B. Monagan, "Applications of Maple to mathematical, scientific, and engineering problems," *Special Issue of MapleTech* (1994) 49-57.
17. R. M. Corless, "What good are numerical solutions of chaotic differential equations?," *Computers in Mathematics with Applications* vol 28, no. 10-12 (1994) 107-121.
16. R. M. Corless, "Error backward," *Contemporary Mathematics* 172 (1994) 31-62.
15. R. M. Corless, "Six, Lies, and Calculators," *American Mathematical Monthly*, vol 100, no. 4, (1993) 344-350.
14. R. M. Corless & G.V. Parkinson, "Mathematical modelling of the combined effects of vortex-induced vibration and galloping, Part II," *J. of Fluids & Structures* 7, (1993) 825-848.
13. A.G. Connell & R. M. Corless, "An experimental interval arithmetic package in Maple," *Interval Computations*, No. 2, (1993) 120-134.
12. R. M. Corless, G.H. Gonnet, D.E.G. Hare and D.J. Jeffrey, "Lambert's W function in Maple," *MapleTech* #9 (1993) 12-22.
11. T.C. Scott, M.B. Monagan, G.J. Fee & R. M. Corless, "Some Applications of Maple to mathematical, scientific and engineering problems," *Artificial Intelligence, Expert Systems & Symbolic Computing* (1992) 165-176.
10. P.A. Rosati, R. M. Corless, C. Essex, & P.J. Sullivan, "An evaluation of the HP28S calculator in calculus," *Australian J. of Engineering Education* vol 3, no. 1 (1992) 79-88.
9. R. M. Corless, "Defect-controlled numerical methods and shadowing for chaotic differential equations," *Physica D* 60(special issue on Experimental Mathematics: Computational Issues in Nonlinear Science) (1992) 323-334.
8. R. M. Corless, "Continued fractions and chaos," *The American Mathematical Monthly* vol. 99, no. 3, March (1992) 203-215.
7. R. M. Corless, D.J. Jeffrey & H. Rasmussen, "Numerical evaluation of Airy functions with complex arguments," *J. Computational Physics* vol. 99, no. 1 March (1992) 106-114.
6. R. M. Corless, C. Essex, M.A.H. Nerenberg, "Numerical methods can suppress chaos," *Physics Letters A* 157, 1 (1991) 27-36.
5. R. M. Corless, G.W. Frank & J.G. Monroe, "Chaos & Continued Fractions," *Physica D.* 46 (1990) 241-253.
4. R. M. Corless & D.J. Jeffrey, "Solution of a hydrodynamic lubrication problem with Maple," *J. Symbolic Computation* 9 (1990) 503-513.
3. R. M. Corless & G.V. Parkinson, "A model of the combined effects of vortex-induced oscillation and galloping," *J. Fluids and Structures* 2 (1988) 203-220.
2. R. M. Corless & D.J. Jeffrey, Stress moments of nearly touching spheres in low Reynolds number flow. *ZAMP Zeitschrift für angewandte Mathematik und Physik*, 39(6):874-884, 1988.
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ARTICLES IN REFEREED CONFERENCE PROCEEDINGS

58. R. M. Corless, George Labahn, Dan Piponi, & Leili Rafiee Sevyeri, [Bohemian Matrix Geometry](#), Proceedings of ISSAC, July (2022), 361–370
57. Neil J. Calkin, Eunice Y. S. Chan, & R. M. Corless, “[Computational Discovery with Newton Fractals, Bohemian Matrices, & Mandelbrot Polynomials](#)”, In Wei-Chi Yang and Douglas Meade, editors, *Proceedings of the Asian Technology Conference in Mathematics*. 2021.
56. R. M. Corless, Leili Rafiee Sevyeri, and B. David Saunders, [Equivalences for Linearizations of matrix polynomials](#), Proceedings of ISSAC, July (2021).
55. R. M. Corless & Erik Postma, [Blends in Maple](#), in R. M. Corless et al. (Eds.): Proceedings of the Maple Conference 2020, CCIS 1414, pp. 167–184, 2021
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52. A.C. Camargos Couto, Marc Moreno Maza, David W. Linder, David J. Jeffrey, & R. M. Corless, “Comprehensive LU Factors for Polynomial Matrices”, MACIS 2019, 80–88
51. R. M. Corless and Leili Rafiee Sevyeri, “Approximate GCD in the Bernstein Basis”, In: Gerhard J., Kotsireas I. (eds) *Maple in Mathematics Education and Research*. MC 2019. Communications in Computer and Information Science, vol 1125. Springer, pp 77–91.
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47. K.A. Folitse, D.J. Jeffrey, and R. M. Corless, “Inverse of the Gamma function.” SYNASC Proceedings (2017).
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45. R. M. Corless, S.E. Thornton, “A Package for Parametric Matrix Computations, Mathematical Software–ICMS 2014.”, Springer, eds. H. Hong, C. Yap, January (2014), 442-449.
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41. R. M. Corless, D.J. Jeffrey and F. Wang, “The asymptotic analysis of some interpolated nonlinear recurrence relations,” Proc. ISSAC 2014, Kobe, Japan, 115-121.
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39. P.W. Lawrence and R. M. Corless, "Numerical Stability of Barycentric Hermite root-finding," Proc. SNC (2011) 147-148.
38. R. M. Corless, E. Postma and D.R. Stoutemyer, "GCD of Multivariate Approximate Polynomials using Beautification with the Subtractive Algorithm," Proc. SNC (2011) 153-154.
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18. R. M. Corless, M.W. Giesbrecht, D.J. Jeffrey, X. Liu & S.M. Watt, "Approximate Polynomial Decomposition", Proc. FRISCO Workshop, Oxford, (1999), 6-8
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4. Neil J. Calkin, Eunice Y. S. Chan, and R. M. Corless, [Computational Discovery on Jupyter](#), a Jupyter Book, version 1.0 released 2022.10.1. To be published in book form by SIAM.
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9. Jack Betteridge, Eunice Y.S. Chan, R. M. Corless, James H. Davenport, and James Grant. “Teaching Programming for Mathematical Scientists.” In Philippe R. Richard, M. Pilar Véléz, and Steven Van Vaerenbergh, editors, *Mathematics Education in the Age of Artificial Intelligence: How Artificial Intelligence can Serve Mathematical Human Learning*, pages 251–276. Springer International Publishing, 2022. [arXiv preprint](#)
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5. R. M. Corless, Jürgen Gerhard, and I.S. Kotsireas, eds, [Maple in Mathematics Education and Research](#), Proceedings of the Maple 2020 Conference, Springer, CCIS volume 1414, (2021).
4. R. M. Corless, N. Fillion, and I.S. Kotsireas, eds, Fields Institute Communications, [Algorithms & Complexity in Mathematics, Epistemology and Science \(ACMES\)](#) Springer (2019).
3. R. M. Corless & I.S. Kotsireas, editors, Special Issue of the Canadian Applied Mathematics Quarterly (Scientific and Symbolic Computing), vol 17, no 3, (2009)
2. R. M. Corless, R. Lauterbach & H.M. Möller, editors, Special Issue of the Journal of Symbolic Computation in honour of Karin Gatermann, vol 44, no 1, (2009)
1. J.M. Borwein, P.B. Borwein, R. M. Corless, & L. Jorgenson, editors, Proceedings of The Organic Mathematics Workshop, CMS Conference Proceedings, vol 20, (1997), 412 pages

PAPERS BY MY STUDENTS WHILE THEY WERE UNDER MY SUPERVISION

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4. R.H.C. Moir, “Feasible Computation: Methodological Contributions of Computer Science”, *Physical Perspectives on Computation, Computational Perspectives on Physics* (2018) 172-194.
3. P.W. Lawrence, “Fast reduction of Generalized Companion Matrix Pairs for Barycentric Lagrange Interpolants”, *SIAM J. Matrix Anal Appl.* vol 35, no. 3 (2013): 1277-1300.
2. A. Amiraslani, “Dividing polynomials when you only know their values”, *EACA* (2004) 5-10.
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SUBMITTED PAPERS

1. Chris Brimacombe, Robert M. Corless, and Mair Zamir, “Elliptic cross sections in blood flow regulation” submitted 19 January 2023

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As Editor-in-Chief of [Maple Transactions](#), my papers in that journal do not count as refereed. Similarly, while I was Editor-in-Chief of ACM SIGSAM Bulletin and later Chair of SIGSAM, ie until 2003, my papers there did not count as refereed.

37. R. M. Corless, “Maple Transactions—The Early Years”, [Maple Transactions](#) 1, 2, 14508
36. Ewan Brinkman, R. M. Corless, Veselin Jungić, “The Theodorus Variation”, [Maple Transactions](#) 1, 2, 14500 November 2021
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32. R. M. Corless, N.J. Higham, and S.E. Thornton, “Cover Image: Bohemian Matrices”, [London Mathematical Society Newsletter](#), November 2020, page 16.
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29. R. M. Corless, N. Rezvani, “The Nearest Polynomial with Lower Degree”, ORCCA Technical Report TR-06-03, (2006), 9 pages
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21. M. Benghorbal & R. M. Corless. “The nth derivative,” *SIGSAM Bull* 36(1) (2002) 10-14.

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17. R. M. Corless, J. Schicho, "Iterated Improvement using the SVD for Singular Linear Systems", ORCCA Technical Report TR-00-09, (2000), 10 pages
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14. R. M. Corless & S.M. Watt, "Report on the SNAP mini" SIGSAM Bull (32)2 1998 35-37.
13. R. M. Corless and D.J. Jeffrey, "Graphing elementary Riemann surfaces," SIGSAM Bulletin, vol. 32, no. 1, issue 123, (March 1998) 11-17.
12. R. M. Corless and D.J. Jeffrey, "The Turing factorization of a matrix," SIGSAM Bulletin, vol. 31, no. 3, issue 121, (September 1997) 21-29.
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10. R. M. Corless, "Gröbner Bases and matrix eigenproblems," SIGSAM Bulletin, vol. 30, no. 4, issue 118, (December 1996) 26-32.
9. R. M. Corless and D.J. Jeffrey, "The unwinding number," SIGSAM Bulletin, vol. 30, no. 2, issue 116, (June 1996) 28-35.
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6. T. Chen, R. M. Corless and H. Rasmussen, "A numerical study of flow past circular cylinder using vortex method," Proc. Third Annual Conference of the CFD Society of Canada, Banff, Alberta, (June 1995) vol. 1, 409-413.
5. R. M. Corless, "What is a solution to an ODE?," SIGSAM Bull (27)4 (1993) 15-19.
4. R. M. Corless and D.J. Jeffrey, "Well, It isn't quite that simple," SIGSAM Bulletin vol. 26, no. 3, issue 101 (1992) 2-6.
3. R. M. Corless, C. Essex, P. Sullivan and P. Rosati, "Using the HP28S calculator in the calculus course for engineering students," Proc. 7th Canadian Conference on Engineering Education, University of Toronto (1990).
2. R. M. Corless and D.J. Jeffrey. A comparison of three computer algebra systems for the solution of a problem in hydrodynamic lubrication. *ACM SIGSAM Bulletin*, 22(2):50-62, April 1988.
1. R. M. Corless and R.B. Simpson. An "off-the-shelf" dynamic mesh capability. *ACM SIGNUM Newsletter*, 18(2):23-24, 1983.

OTHER PUBLICATIONS

3. Neil J. Calkin, Eunice Y.S. Chan, & R. M. Corless: The [Bohemian Matrix Calendar 2022](#), entered in the Clemson Science as Art competition.

2. R. M. Corless, The Lambert W Function Poster (2004) This poster describes some interesting properties of a recently named mathematical function. 4000 copies were produced and widely distributed. <http://www.orcca.on.ca/LambertW/>
1. R. M. Corless, “About the Applied Math Coffee Mug Design” (1998)

SELECTED TALKS

23. Teaching Programming to Mathematical Scientists, CUNEF, Madrid, Spain, February 2020
22. Masterclass on Maple (parts I and II), Isaac Newton Institute, 2019
21. “An Old Special Function meets a (slightly) Newer One”, Isaac Newton Institute, Nov 2019
20. “Bohemian Companions”, MEGA 2019 plenary, Madrid, June 2019
19. “Bohemian Matrices”, U. Manchester (Manchester UK, 20 June, 2018) [YouTube Link](#)
18. “Bohemian Eigenvalues”, U. Alcalá (Alcalá de Henares Spain, 18 May, 2017).
17. “Gamma and Factorial in the Monthly”, opening plenary, ACA (Jerusalem Israel, 17 July, 2017).
16. “Approximating the Functional Inverse of Gamma”, [BIRS video link](#) (Oaxaca Mexico 2016).
15. “The Lambert W Function”, Celebrating 20 years of W (Western University, July 2016).
14. “Bohemian Eigenvalues”, Computational Discovery (Western, 2016). [YouTube Link](#)
13. “Twenty plus years of the Lambert W. Function”, International Conference on Analysis, Applications, and Computations: In Memory of Lee Lorch, Fields Institute (September 2015).
12. “Optimal Backward Error and the Leaky Bucket”, ACMES (Western University, May 2015)
11. “Optimal Backward Error and the Dahlquist Test Problem”, SPCOM (Newcastle AU, 2015)
10. “Computer Algebra for Experimental Mathematics”, TRICS (Western, 2014)
9. “What is Experimental Mathematics?”, Undergraduate Society of Applied Mathematics (Western University, October 2014)
8. “Numerical Stability of Polynomial Eigenvalue Algorithms in the Lagrange Basis,” MATFUN (Manchester, UK) (April 2013).
7. “Polynomial or Rational Interpolants in the Lagrange Basis,” ANODE (Auckland 2013).
6. “Defect assessment for numerical solutions of chaotic DE,” MAGIC (Mistletoe Bay NZ 2012).
5. “First encounters of a Chebfun Novice,” ICIAM, Vancouver (2011).
4. “Polynomial Algebra for Birkhoff Interpolants,” SANUM, Stellenbosch, SA (2010).
3. “Pseudospectra of Matrix Exponential Polynomials,” SNC, Kyoto, Japan (August 2009).
2. “Numerical Nonlinear Algebra,” COSCOMP Conference on Scientific Computing, Vienna, Austria, (June 2005).
1. “Computer-Mediated Thinking,” Invited plenary lecture at “Technology in Mathematics Education”, TIME, Montreal, (July 2004).

Teaching

PHILOSOPHY

Teaching is an essential part of scholarship. My late friend and colleague, Vic Elias, put it this way: “You teach this stuff long enough, you learn how to use it.” The 1981 Nobel Laureate for Chemistry, Roald Hoffman, similarly said “[I]t is through teaching that [young academics] become better researchers.” It is also true that the teaching part of a professor’s career, which nominally makes up only

40% of the workload, is expected to have by far and away the greatest direct and leveraged effect on society and civilization. Teaching makes us human. But research informs teaching, too. The first and most obvious way is in constructing syllabi and the programs they shape: research tells us what to teach, and why. Therefore, *what* to teach changes continually as knowledge advances. Further, *tools* for teaching have changed radically with the introduction of the web, wide social networks, online resources including videos, and will change even more radically as AI takes hold. But another way that research informs teaching, which is likely to remain important, is that human researchers can show themselves as excited learners, and can share the electricity of being on the border of the unknown. Research also tells us (if we're listening) *how* to teach, and how students learn. The pedagogical literature is unequivocal: engaged, active learning is a critical component in deep, integrated learning. The student must do, to understand. The addition of radical new tools has not changed that, so far. Finally, teaching is a human activity. Besides having something to teach, and knowing how to teach it, the professor must be a social person, able to show warmth, strength, and confidence, as needed. Goethe in a letter to one of his teachers said "instruction does much, but encouragement does more." Teachers must continually learn how to best encourage students. This is critical for equity, which is a moral imperative. It also has an instrumental benefit, by effectively broadening the pool of talent for recruitment.

RECORD

I was at Applied Mathematics at Western for thirty-two years. I taught engineering mathematics at all levels, applied mathematics for scientists at all levels, and a wide variety of graduate courses. Since about 2010 I have used and continue to advocate for *active learning*. I designed the introductory undergraduate and graduate numerical analysis courses. In 2014 I designed a course in experimental mathematics, which is described in some of my publications listed above. Recent courses, ignoring sabbaticals in the dates, are listed in Table 1. The normal teaching requirements in Applied Mathematics at Western were four half-courses per year, with one half-course reduced if you supervise three graduate students. Apart from sabbaticals and the occasional overload, this is the amount I taught.

| | | | |
|-----------|-------------|---|-----|
| 2012–2019 | AM2813b/14g | Numerical Analysis | 7/7 |
| 2017–2019 | AM3811a | Complex Variables | 7/7 |
| 2009–2019 | AM9561a | Graduate Numerical Analysis | 7/7 |
| 2014–2016 | AM9619a/b | Open Problems in Experimental Mathematics | 7/7 |
| 2014–2015 | AM1999f | Experimental Mathematics | 7/7 |
| 2013–2016 | CA2303b | Calculus IV | 7/7 |
| 2015–2016 | AM2276b | Engineering Calculus IV | 5/7 |
| 2010–2013 | CA1301b | Calculus II | 5/7 |
| 2010–2011 | CA1000a | Calculus I | 5/7 |

Table 1: Courses taught 2010–2019 and median student survey results

Several of my listed publications can be considered research in mathematics education; for instance, the book chapter 9 listed above. I am particularly concerned with the ethics of teaching with AI. I have supervised or co-supervised seventeen PhD theses, twelve masters theses, and eight post-doctoral

fellows (one currently). My former students have gone on to careers in academia and in industry. I have supervised twenty-six honours B.Sc. theses; many of these students have gone on to graduate degrees at excellent institutions, including Oxford.

I continue to serve on thesis committees, examining boards, as external examiner (most recently for two theses out of the University of Newcastle, Australia), and as chair of thesis exams at Western.

List of PhD Students Advised:

| | |
|------|--|
| 2020 | Leili Rafiee Sevyeri, Hybrid Symbolic-Numeric Computing in Linear and Polynomial Algebra |
| 2019 | Eunice Y.S. Chan, Algebraic Companions and Linearizations |
| 2019 | Steven E. Thornton, Algorithms for Bohemian Matrices |
| 2017 | Robert H. C. Moir, Feasible Computation in Symbolic and Numeric Integration |
| 2013 | Yiming Zhang, Computation Sequences for Series and Polynomials |
| 2013 | Piers W. Lawrence, Eigenvalue methods for Interpolation Bases |
| 2009 | Hui Ding, Numerical and Symbolic Computation of the Lambert W Function in $C^{m \times n}$ |
| 2007 | Azar Shakoori, Bivariate Polynomial Solver by Values |
| 2006 | Jichao Zhao, Accurate Compact Finite Difference Method and its Applications |
| 2006 | Amir Amiraslani, New Algorithms for Matrices, Polynomials, and Matrix Polynomials |
| 2006 | Marie-Paule Gagne-Portelance, Computing Feynman Integrals in Non-Commutative Spaces |
| 2005 | Silvana Ilie, Computational Complexity of Numerical Solutions of IVPs for DAEs |
| 2004 | Mhenni Benghorbal, Power Series Solutions of Fractional DE's and Symbolic Derivatives |
| 2000 | Hualiang Zhong, Non-harmonic Fourier Series and Applications |
| 1999 | Xianping Liu, Symbolic Tools for the Analysis of Nonlinear Dynamical Systems |
| 1998 | Anne-Marie E. Allison, Analytical Investigation of a Semi-empirical Flow-induced Vibration Model |
| 1997 | Mohammed O. Ahmed, Exploration of Compact Methods for Numerical Solution of PDEs |

List of Masters Students Advised:

| | |
|------|--|
| 2019 | Irene Novarinho, AIMS, Backward Error for Continued Fractions |
| 2019 | Jeet Trivedi, A Survey of Quadrature Methods for Oscillatory Integration |
| 2016 | Eunice Y.S. Chan, A Comparison of solution methods for Mandelbrot-like polynomials |
| 2016 | Leili Rafiee Sevyeri, A Sequence of Symmetric Bézout Matrix Polynomials |
| 2011 | Nic Fillion, Backward Error Analysis as a Model of Computation |
| 2010 | Robert H. C. Moir, Reconsidering backward error |
| 2005 | Nargol Rezvani, Approximate Polynomials in Different Bases |
| 2003 | Azar Shakoori, Solving Bivariate Polynomials by Eigenvalues |
| 2001 | Xiaofang Xie, Symbolic Circuit Analysis |
| 2001 | Dicheng Liu, A Notation Selection Tool for MathML |
| 2000 | Gurjeet Litt, Unwinding Numbers for the Logarithmic, Inverse Trig & Hyperbolic Functions |
| 1995 | Xianping Liu, Perturbation Package to solve ODEs in Maple |
| 1990 | Valentin Vangelov, <record of project title lost> |

Service to the profession

LEADERSHIP POSITIONS

I was Scientific Director of the Ontario Research Center for Computer Algebra (ORCCA) from 2015 until 2022, and the founding Deputy Director before that. ORCCA is a consortium of twelve faculty members and about sixty graduate students and postdoctoral fellows at Western University and the

University of Waterloo, with other members at other Ontario universities. See www.orcca.on.ca. I was Chair of the Department of Applied Mathematics from 2002 till 2007. I was elected Chair of the ACM Special Interest Group on Symbolic and Algebraic Manipulation (SIGSAM) from 1999–2003. I enjoy such roles, because they give me a chance to ensure that my colleagues get the appropriate rewards for the work that they do. During my time as Department Chair of Applied Mathematics, I directed the hiring of five tenure-stream faculty, and successfully lobbied for market adjustments in salary for several outstanding faculty and staff members, successfully nominated many people for research and teaching awards, and fostered the increase in percentage of female PhD students, to the point where we were the first mathematical sciences department of any substantial size to reach 50%. Overall the Department’s profile grew significantly while I was Chair, and the number of faculty members grew from 14 to 19. I also oversaw a fundamental change in research direction, away from classical fluid mechanics and into mathematical biology, mathematical finance, and computational materials and biomaterials. All three research areas are vigorous to date.

I have been committed to equity for decades. Equity is, of course, a moral imperative, and a duty owed. However, equity and diversity are also of instrumental value, with recent publications documenting the increased impact that diverse teams have in research (as measured by citation count). But even if it were of *no* instrumental value, it would still be required of us.

The other techniques to increase equity and diversity that I have learned from my experience, beginning when I was the CAIMS delegate to the CMS Committee for Women in Mathematics, are still needed today. The principal lesson is that *warmth*—of course, rule-governed warmth—is needed, rather more than one might expect from mathematicians, and rather more than was traditionally available in a science or engineering educational context. See my paper “Creating a Warmer Environment for Women in Mathematics and in Philosophy” with Samantha Brennan (paper 6i in the list of journal papers above) for more details.

UNIVERSITY SERVICE

I have served on most of the usual committees appropriate for my years of experience, including University Senate, selection committees for Deans and Chairs, and P&T committees.

I am a member of the [Rotman Institute for Philosophy](#) and have been since its founding in 2008. I have served on its Steering Committee, and on search committees for interdisciplinary CRC candidates. Many people *talk* about interdisciplinarity and multidisciplinary, but the Rotman Institute actually practices it. I am very proud of my connection to the Institute.

ACADEMIC EXTERNAL SERVICE

I regularly serve in various roles for conference organization; I am co-Chair with Paulina Chin of the Program Committee for the Maple Conference Nov 2–5 2021; last year I was co-Chair with Jürgen Gerhard for the 2020 conference. I have been the principal organizer for conferences sponsored by the Fields Institute, and for minisymposia at SIAM meetings and at ICIAM, most recently on Bohemian Matrices and Applications at ICIAM 2019 in Valencia. I have proposed a minisymposium for SIAM 2021 with Nick Higham on the same topic.

I was the Editor-in-Chief of the ACM SIGSAM Bulletin from 1996–1999. In that time I wrote several editorial columns (listed in Technical Reports and Unrefereed Contributions above), some of which

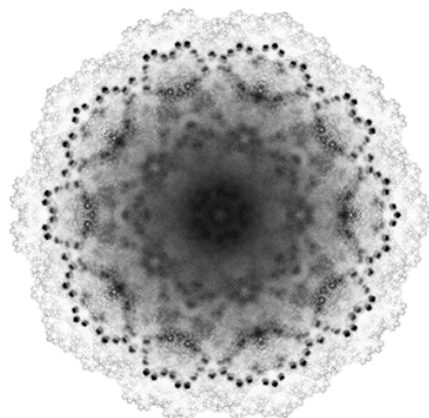
later became highly cited. I instituted the Formally Reviewed Articles section of the Bulletin, and changed the name of the publication to ACM Communications in Computer Algebra. In this endeavour I was helped greatly by David Jeffrey, who became Editor-in-Chief when I became SIGSAM Chair, and who continued and solidified this work.

I am now the Editor-in-Chief of [Maple Transactions](#), a new open-access scholarly journal sponsored by Maplesoft and by Scholarship Western. This journal has no page charges for authors, and was launched in June 2021.

I am a life member of CAIMS (the Canadian Applied and Industrial Mathematics Society), a member of ACM and ACM SIGSAM, a member of the Canadian Society for History and Philosophy of Mathematics, and a member of SIAM.

I have reviewed several departments and programs and for granting agencies (including for the NSF (USA), the ANR (France), and the FWF (Austria)). I am a regular reviewer for several journals, including the American Mathematical Monthly, Linear Algebra and Applications, Numerical Algorithms, the Journal of Symbolic Computation, and SIAM Review.

ENDNOTE: BOHEMIAN MATRICES AND VISUALIZATION OF MATHEMATICS



Just to have a nice picture at the end of my CV, here is a density plot of the complex eigenvalues of ten million upper Hessenberg Toeplitz matrices with population from the fifth roots of unity. See [bohemianmatrices.com](#), the journal paper [96](#), or the unrefereed note [32](#) for more information. Image by my former PhD student Steven E. Thornton.