

Curriculum Vitae for:  
**Keith G. Calkins**  
**Andrews University**  
Math & Science Center  
AU id: 23938

## Contact Information:

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Andrews University	home address since 1979:
Berrien Springs, Michigan 49104-0140	610 N. Main St.
USA	Berrien Springs, Michigan 49103-1013

## Education:

Ph.D. 2005 University of Notre Dame (Physics)  
Absolute Optical Frequencies Measurements of the Cesium  $D_1$   
Transitions and Their Effect on Alpha, the Fine-Structure Constant

2003 Andrews University (Educational Administration)

MAT 2002 Andrews University (Secondary Education)  
Michigan Certified in Math, Physics, Chemistry, and Computer Science

M.S. 1996 University of Notre Dame (Physics)

M.S. 1991 Andrews University (Interdisciplinary Studies, Math and Physics)

M.S. 1982 Andrews University (Computer Information Science)

B.S. 1981 Andrews University (Math (and in 1988 Physics, with honors))  
X-ray Radial Distribution Studies of Amorphous  
Germanium-Antimony-Chalcogen Alloys

Last updated November 27, 2008. If you are reading a paper version, check the web for the latest version: <http://www.andrews.edu/~calkins/profess/cvitae.pdf>

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<sup>1</sup>Approved at October 28, 2008 board meeting, retroactively, effective date not clear since it had no monetary effect.

## Experience:

2008–present	<b>Associate Prof. of Math &amp; Science</b> Coordinate and teach mathematics in the Berrien Co. Math & Science Center (public high school program for accelerated students). Supervise students, other math teachers, and workers; track budgets, supplies, calculators, and textbooks; advise students; coordinate competitions; develop curriculum.	Andrews University Berrien Springs, MI	49104-0140
1993–2008	<b>Unranked Faculty/Scientist<sup>2</sup></b> Berrien Co. Math & Science Center (High School since 1993): mathematics, computer science, statistics. (University): computer programming, language short courses, maintenance, computer applications in architecture, math ed, statistics, and guest lectures, much during 1978–93.	Andrews University Berrien Springs, MI	49104-0140
1983–1993	<b>Asst. Dir. for Technical Support</b> Responsible for hardware/software maintenance and development team; data communications network; microcomputers; academic computing; resource management; security and disaster recovery. Title from 1983–87 was: <b>Manager, Computer Systems Programming, Hardware Maintenance and Development.</b>	Andrews Univ. Computing Center Berrien Springs, MI	49104-0880
1978–1983	<b>Syst. Prog. &amp; Hardware Engineer</b> Responsibilities included: systems programming (CP-V), security, hardware installation, development, and maintenance for Xerox Sigma 6, 7, and 9 computers and related peripherals.	Andrews Univ. Computing Center Berrien Springs, MI	49104-0880
Summer 2006	<b>Visiting Scientist</b> Department of Chemistry, NSF Research Experience for Teachers (RET).	University of Rochester Rochester, NY	14627

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<sup>2</sup>The University invented a new, temporary “rank” of Lecturer II about 1998 and some claimed I was then so classified, despite the resulting conflict with the Working Policy. No written agreement to that effect exists so my classification remained unresolved. My service record says Instructor for 7/93–12/00 and Asst. Prof. for 1/01–12/07 partly because lecturer is not in their system.

2006–2007	<b>Adjunct Faculty</b> Taught sections of Engineering (calculus) and General (algebra) physics and supervised laboratories.	Lake Michigan College Benton Harbor, MI 49022
2003–2005	<b>Research Assistant</b> Department of Physics	University of Notre Dame Notre Dame, IN 46556-5670
2002–05,07–08	<b>AP Calculus AB/BC Reader</b> June in Col., Ky, Kansas	Educational Testing Service Princeton, NJ 08541
1993–present	<b>Farmer/Sawyer</b> (2 miles south 1972–75)	Calkins Centennial Farm 14671 22 Mile Rd Tustin, MI 49688-8555
1991–1993	<b>Graduate Assistant</b> Department of Physics	University of Notre Dame Notre Dame, IN 46556-5670
Fall 1988	<b>Graduate Research Semester</b> Chemical Technology Division	Argonne National Laboratories Argonne, IL 60439
1980–present	<b>Consultant</b> Artware, Telefile, NASA (Lockheed), Warner, Interlink, BCISD/Berrien RESA	$\overline{X}D\overline{X}$ 610 N. Main St. Berrien Springs, MI 49103-1013

## Awards:

Honored Teacher:<sup>3</sup> 1996 (Berrien County Math & Science Center, senior class, honors night) 1996 (Niles, Rebecca Shelton, valedictorian), 1997 (Niles, Kara Lindstedt, valedictorian), 1998 (Niles, Shawn Gano, valedictorian), 2002 (Edwardsburg, Mary Scapino, NHS), 2003 (Edwardsburg, Greg Marbach, NHS), 2005 (Niles, Collin Aycock, honors), 2006 (Edwardsburg, Gwen Fleming, NHS), 2007 (Niles, Jim Heide, valedictorian).

25-year Service Award, Andrews University, 2004.

20-year Service Award, Andrews University, 2000.

15-year Service Award, Andrews University, 1995.

Advisor for Michigan Math League team, best in region: 1996–97, 1997–98, 2002–03, 2003–04.

Advisor for winning Cybersurfari team: 1996 (2nd & 3rd), 1997 (1st), 1998 (1st), 2000 (1st).

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<sup>3</sup>Year (school, nominating student, and event). Niles does it as part of an honors night for seniors. Edwardsburg does it as part of their National Honors Society Induction. The 1996 BCMSC event was the only time an honored teacher has been so named as part of our honors night program!

AHSME/AMC (American Math Competition) team excellence: 1995, 1997, ..., 2003, 2004, 2005.

Spring 1981, Lower Michigan Mathematics Competition, third place team (with members Hernan Visani and Lincoln Bourne).

Best Sophomore Physics Student, Andrews University, May 1977.

College Bowl team (Captain), fall 1976, second place.

## **Affiliations:**

American Mathematical Society

Pi Mu Epsilon, Math Honors Society

American Physical Society

Sigma Pi Sigma, Physics Honors Society

Phi Kappa Phi, Interdisciplinary Honors Society

Sigma Xi, The Scientific Research Society

Andrews Scholars, Andrews University Honors Society

Sons of the American Revolution

Berrien County Genealogical Society, Western Michigan Genealogical Society

Michigan Centennial Farm Association

National Speleological Society, AuAg (formerly Andrews University Area Grotto)

## **Certifications:**

State of Michigan Professional Education Certificate for secondary Chemistry, Computer Science, Mathematics, and Physics. Expiration date: 06/30/2010.

State of Michigan Provision Certificate for secondary Chemistry, Computer Science, Mathematics, and Physics. Expiration date: 06/30/2007.

## Professional Activities:

### Teaching: Andrews University, Berrien County Math & Science Center (gifted high school program)

2008–09: RESA Alg., Geo., Algebra II, Precalc, AP Calc BC, web  
2007–08: ISD Alg., Geo., Algebra II, AP Stat, (Precalc), AP Calc AB, web  
2006–07: ISD Algebra, Geometry, Algebra II, resident guru  
2005–06: ISD Algebra, Geometry, Algebra II, Precalc, AP Calculus BC, web  
2004–05: ISD Algebra, Geometry, AP Statistics, AP Calculus BC, web  
2003–04: ISD Algebra, Geometry, Precalculus, AP Statistics, web  
2002–03: ISD Algebra, Geometry, Precalculus $\times$ 2, AP Calculus BC, web  
2001–02: ISD Algebra, Geometry/2, Algebra II, (Precalc), AP Calc. AB, web  
2000–01: ISD Algebra, Geometry, Algebra II, (Precalc), AP Calc. AB, web  
1999–00: ISD Alg., Geometry, Alg. II, AP Statistics, AP Calc. AB/BC, web  
1998–99: ISD Alg., Geo., Alg. II, Precalc, AP Calc. AB/BC, web publishing  
1997–98: ISD Algebra, Geometry, Algebra II, Precalculus, AP Calc. AB/BC  
1996–97: ISD Algebra, Geometry, Algebra II, Precalculus, AP Calc. AB/BC  
1995–96: ISD Algebra, Geometry, Algebra II, Precalculus, AP Calculus AB  
1994–95: ISD Algebra, Geometry, Algebra II, Precalculus, AP Calculus AB  
1993–94: ISD Geometry, Algebra II, Precalculus

### Teaching: Andrews University, undergrad. or graduate

Summer 2005: EDRM611: Applied Statistics in Education and Psychology  
Summer 2001: MAED510: Algebra & Functions; Lead Teacher  
Spring 1987: GTEC395, Coop Work Experience  
Spring 1985: COSC496, Special Projects  
Spring 1985: COSC495, Independent Study  
Winter 1984: COSC417, Computer Applications in Architecture  
Fall 1983: COSC495, Independent Study (Sigma 7 CPU)  
Winter 1983: COSC417, Computer Applications in Architecture

Spring 1982: COSC495, Independent Study, Sigma 6 Assembly (hardware)

Spring 1982: COSC145, Fundamentals of Computer Science

Fall 1981: COSC115, Introduction to Computer Programming

1981–82: Operating Systems (I prepared the lectures, another student gave them, Dr. Larry Turner credited with teaching)

Summer 1981: Masters Independent Study, Computer Science (Dr. Larry Turner credited with teaching)

June 1978: Fortran Short Course, Andrews University Computing Center.  
Note: I taught other short courses, but this was the first.

### **Teaching: Lake Michigan College**

2006–07 PHYS 101/102 & 201/202 General & Engineering Physics

### **Teaching Assistant: University of Notre Dame**

1991–93: general physics, numerical analysis, experimental physics, computer administrator.

## **Service:**

**Berrien Co. Science Olympiad, Fermi Questions, 2006–08.**

**American Red Cross 4–6 times/year blood donor, since 1997.**

**Supervise High School students on campus, 1993–present .**

**Fall 2002–2007 Typeset/Edit/Author Specht Geometry Project.**

**June 2002–05; 07–08: “Read” AP Calculus Exams in Fort Collins, Louisville, and Kansas City.**

**Spring 2008: Search Committee, new Math Lecturer position.**

2007: *ad hoc* Committee for 40 Years of Computing@Andrews, homecoming meetings (Sep.), emceed opening, provided opening video, provided parade float.

**2007: Member, University Self-Study Criterion 5 Subcommittee and Introduction subcommittee thereof. Site visit is March 2009.**

**Chaperoned Sophomore class trips to Smoky Mountains. April 1994; May 1995; November 1995; September 1996; September 2004–08.**

**Chaperoned Center lock-ins, twice yearly, 1997–2008.**

**Hosted Alumni Christmas Party, December 1993–2007.**

Chaperoned Senior class trip to Pipestem, West Virginia, April 1997.

Wrote/edited newsletters for the Andrews University Computing Center during the 1980's.

Wrote/edited newsletters for the Fox-Bullen Reunion Association, 1994–present.

Wrote/edited newsletters for AuAg (formerly Andrews University Area Grotto) during the mid 1980's.

Fall early 2000's interviewer for Professional Days for new teachers.

Fall 2001; Assisted with development of local Chess club.

July 1999; AP Statistics Development/Planning Session, Durham, NC.

Summer 2007 Unique donations to Computer History Museum.

**1994–present: Administrator for math contests (MML, MMPC I/II, AMC, AIME).**

**1993–present: “Area Coordinator” for ISD Mathematics.**

**Advisor for about 55 Jr./Sr.; recommendations; EXPO; etc. De facto until 2008.**

Guest Lectures (Exceptional Children, December 3, 2001 and April 23, 2002.

“Dr. Math” type e-mail answering service (see web publishing listed below).

Member various Genealogy societies (SAR, BCGS, WMGS).

Member various Speleological Societies (NSS, AuAg, IKC).

Member various professional and honor societies: AMS, Phi Kappa Phi, Pi Mu Epsilon, Sigma Pi Sigma.

Active with Computer History Museum efforts to preserve Xerox Sigma Computers.

Member preservation societies: Michigan Centennial Farm, Elm, Chestnut, Monarch, etc.

1984–87: Secretary of AU's Technical Review Committee, a subcommittee of the AU Computing Committee.

1985? Faculty Fall Fellowship Committee under Paul Brantley.

1985–88: TeleXchange Board Member and Chairman of the Telefile Control Program V General Interest Group.

1982–present: Sigma Users Exchange Librarian

Committee member for Local Programming Contests: early 1980's.

## Publications:

### Major Book Submitted for Publication

“Euclidean Geometry and its Subgeometries,” of “Geometry, Reflection on the Axioms,” K. Calkins, H. Jones, E. Specht. Draft to Ed Dunne at American Mathematics Society on January 24, 2007. Not accepted for publication February 15, 2007. December 11, 2006 and later, Charlene Cerdas of Springer expressed an interest in the manuscript. Don Rhoads, former math chair, is now involved with this project.

### Refereed Journal Articles Published

\*\* “On mesh-based Ewald methods: Optimal parameters for two differential schemes.” Harry A. Stern and Keith G. Calkins, *Journal of Chemical Physics*, **128**, June 6, 2008, 214106-1–8. PDF: [http://www.andrews.edu/~calkins/uofr/jcp\\_128.pdf](http://www.andrews.edu/~calkins/uofr/jcp_128.pdf).

“Optical frequency measurements of  $6s\ ^2S_{1/2} \rightarrow 6p\ ^2P_{1/2}$  transitions in  $^{133}\text{Cs}$  and their impact on the fine-structure constant,” V. Gerginov, K. Calkins, C. E. Tanner, S. Diddams, A. Bartels, J. McFerran, L. Hollberg, *Physical Review A* (73), March 2006, 032504-1–10.

“Structure of Acidic Haloaluminate Melts: Neutron Diffraction and Quantum Calculations,” M. Blander, E. Bierwagen, K. Calkins, L. A. Curtiss, D. L. Price, M.-L. Saboungi, *Journal of Chemical Physics*, **97** (4), Aug. 15, 1992, 2733–41.

“Computer Assisted Analysis of Nuclear Magnetic Resonance Spectra,” K. Calkins, R. Daley, *Journal of Chemical Education*, May 1978, 322.

### Dissertation

“Absolute Optical Frequencies Measurements of the Cesium  $D_1$  Transitions and Their Effect on Alpha, the Fine-Structure Constant,” Ph.D. Dissertation available at <http://edt.nd.edu>, May 2005.

### Scholarly/Professional Papers Read

“Programming Languages and Utility Report.” TeleXchange Proceedings, New York, June 1985.

“Tele-Edit: The New Editor.” TeleXchange Proceedings, Newport Beach, CA, January 1985.

“The COMPUTER That Will Not Die: The SDS Sigma 7.” TeleXchange Proceedings, Orlando, June 1984.

“Improving COBOL Performance.” *Xerox Users Exchange Proceedings, 31st Exchange*, San Francisco, October 1979, 231. (Presented by coauthors D. Bidwell, and G. Plue due to extenuating circumstances.)

## Presentations

“Archimedes *Problema Bovinum*,” Andrews University, Eigen Seminar, April 4, 2008.

“Axioms of Geometry,” Andrews University, Eigen Seminar, Jan. 26, 2007.

“Particle-Particle Particle-Mesh Ewald Method: Accuracy and Speed Investigations,” Andrews University, Chemistry (Oct. 5, 2006), and Math/Physics (Oct. 6, 2006), Seminar.

“Absolute Optical Frequency Measurements of the Cesium D<sub>1</sub> Transitions in a Thermal Atomic Beam using a Femtosecond Laser Frequency Comb,” APS April Meeting, April 18, 2005, Tampa. V. Gerginov, K. Calkins, C. E. Tanner, S. Diddams, A. Bartels, J. McFerran, L. Hollberg. Presented by Tanner.

“Absolute Optical Frequency Measurements of the Cesium D<sub>1</sub> Transitions and Their Effect on Alpha, the Fine-Structure Constant,” University of Notre Dame, Dissertation Defense, March 16, 2005.

“Absolute Optical Frequency Measurements of the Cesium D<sub>1</sub> Transitions and Their Effect on Alpha, the Fine-Structure Constant,” Andrews University, Eigen Seminar, Feb. 11, 2005.

“Precise Cesium D<sub>1</sub> Line Measurement and Alpha,” PHYS699, Univ. of Notre Dame, Feb. 26, 2004.

“Precise Cesium D<sub>1</sub> Line Measurement and Alpha,” Andrews University, Eigen Seminar, Feb. 13, 2004.

“Calculator Uses and Abuses,” High School Workshop, Andrews University, June 2003.

“Interviewing for the Principalship,” EDAL570, Andrews University, April 2003.

“Principal Succession at BCMSC,” EDAL520, Andrews University, Nov. 2002.

“The Topology of our Universe,” NCSSSMST, Durham, North Carolina, March 2002.

“AP Statistics and You, an Inside View,” Presentation, Berrien Springs ISD, Feb./March 2000.

“Why AP Statistics?,” North Carolina School of Science and Math, July 1999.

“Useful Programs for the TI-82 Graphing Calculator for High School Mathematics.” Graphing Calculator Users Group, February 1996.

## Panel Discussions:

“FORTRAN77 Certification under TCP-V,” Panel Discussion, Long Beach, February 1988.

“Porting C Language and Display Screen Editor from TCP-V to TCP-R,” Panel Discussion, Washington DC, June 1987.

“Operating System Corrections and Directions,” Panel Discussion, Dallas, June 1986.

“New Loader Requirements,” Panel Discussion, TeleXchange, Anaheim, January 1986.

“Full Screen Editor Capabilities,” Panel Discussion, TeleXchange, San Francisco, January 1984.

“Xerox Users Group Library,” Panel Discussion, TeleXchange, Washington, DC, June 1983.

## Scientific/Scholarly Abstracts

“ $2^{37156667} - 1$  is a Mersenne Prime,” Elvenich, Woltman, Kurowski, *et al*,<sup>4</sup> September 2008.

“ $2^{43112609} - 1$  is a Mersenne Prime,” Smith, Woltman, Kurowski, *et al*, August 2008.

“ $2^{32582657} - 1$  is a Mersenne Prime,” Cooper, Boone, Woltman, Kurowski, *et al*, September 2006.

“ $2^{30402457} - 1$  is a Mersenne Prime,” Cooper, Boone, Woltman, Kurowski, *et al*, December 2005.

“ $2^{25964951} - 1$  is a Mersenne Prime,” Nowak, Woltman, Kurowski, *et al*, Feb. 2005.

“ $2^{24036583} - 1$  is a Mersenne Prime,” Findley, Woltman, Kurowski, *et al*, May 2004.

“ $2^{20996011} - 1$  is a Mersenne Prime, Shafer, Woltman, Kurowski, *et al*, Dec. 2003.

“ $2^{13466917} - 1$  is a Mersenne Prime,” Cameron, Woltman, Kurowski, *et al*, Nov. 2001.

“ $2^{6972593} - 1$  is a Mersenne Prime,” Hajratwala, Woltman, Kurowski, *et al*, June 1999.

“ $2^{3021377} - 1$  is 37<sup>th</sup> Mersenne Prime,” Clarkson, Woltman, Kurowski, *et al*, Jan. 1998.

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<sup>4</sup>GIMPS or the Great Internet Mersenne Prime Search is a large cooperative project using the idle cycles of many computers. Primary credit goes to those assigned the lucky exponents to check and those coordinating the efforts. However, the *et al* includes everyone involved in the project which includes Keith G. Calkins since Nov. 1996 and various of my students.

“ $2^{2976221} - 1$  is 36<sup>th</sup> Mersenne Prime,” Spence, Woltman, *et al*, August 1997.

“ $2^{1398269} - 1$  is 35<sup>th</sup> Mersenne Prime,” Armengaud, Woltman, *et al*, November 1996.

I have shown by Lucas-Lehmer testing that many Mersenne Numbers are not prime. Some recent ones (also reported on Primenet) are listed below. Mersenne Numbers factored, including in 2007:  $2^{33165709} - 1$  with 1038458691818380427143 and in 2008:  $2^{42253291} - 1$  with 1063578210403160478097.  $2^{50243419} - 1$  with 65075136362586361247.

$2^{24589949} - 1$ ,  $2^{30098711} - 1$ ,  $2^{30099383} - 1$ ,  $2^{33165689} - 1$ ,  $2^{26532403} - 1$ ,  $2^{29976637} - 1$ ,  
 $2^{30436957} - 1$ ,  $2^{28084807} - 1$ ,  $2^{32209249} - 1$ ,  $2^{27471043} - 1$ ,  $2^{27521569} - 1$ ,  $2^{32788519} - 1$ ,  
 $2^{32913607} - 1$ ,  $2^{32778463} - 1$ ,  $2^{37480543} - 1$ ,  $2^{37849313} - 1$ ,  $2^{28883843} - 1$ ,  $2^{33052361} - 1$ ,  
 $2^{38929039} - 1$ ,  $2^{40336787} - 1$ ,  $2^{40420381} - 1$ ,  $2^{40710811} - 1$ ,  $2^{40872763} - 1$ ,  $2^{40873421} - 1$ ,  
 $2^{41684443} - 1$ ,  $2^{42211717} - 1$ ,  $2^{42375217} - 1$ ,  $2^{42926837} - 1$ ,  $2^{42929353} - 1$ ,  $2^{43220537} - 1$ , and  
 $2^{43843721} - 1$ .

Since January 2004 I found six hundred million zeroes of the Riemann zeta function for the ZetaGrid research project.

## Book Reviews

**Prelude to Calculus**, Sheldon Axler, April 2006, Prepublication phone/web focus group interaction for publisher.

**Geometry**, UCSMP, third Edition, April 2006, prepublication consulting for publishers.

## Non-Refereed Publications

### High School Math/Statistics Lectures, web-based

“Numbers and Their Application to Math & Science.” (Updated 2007, 170 pages)

“An Introduction to Statistics.” (Updated 2007, 112 pages.)

“A Review of Basic Geometry.” (Updated 2007–08, 247 pages.)

“All About Algebra.” (Updated 2007–08, 168 pages.)

“Probability & Distributions.” (Updated 2008, 144 pages.)

“Calculus Cloze Exercises and Other Supplements.” (Updated 2007–08, 112 pages.)

“Applied Statistics,” (Summer 2005, 126 pages).

### Math related

“Archimedes’ *Problema Bovinum*,” March 1976. Condensed/submitted for publication Sep. 1980. Not accepted. HTML formatted/web posted fall 1995. Cited in

Italian publication June 2004 (not accepted for publication).

“Pentomino Triplication: An Extensive Investigation of the  ${}_{12}C_9$  (220) Successful and Unsuccessful Subsets,” July 1976.

## Computer related

“Keith G. Calkins – Math, Science, Computers, Genealogy,” Andrews University, 1996.

“Extensive Collection of computer programs written in AP and FORTRAN,” often specific for the Sigma 6/7/9 CP-V environment. Includes “Gran,” “K,” and other software programs and improvement projects.

“AUCC User’s Manual,” 7<sup>th</sup> edition, revised with Lorena Bidwell, Sep. 1987.

“Tele-Edit User’s Manual,” January 1984.

“Sigma Maintenance Made Simple,” Internal AUCC document, July 1981–91.

“AUCC Self-Study,” Under pseudonym of ElRoy H. Betton, 1984.

“AUCC COC and LIU Hardware Documentation,” October 1980.

“Generation of a Mill-playing Program,” August 1981.

“Nine Men’s Morris also known as Mill,” September 1978.

## Physics/Chemistry related

“Investigation of the Structure of Acidic Haloaluminate Melts,” Argonne National Laboratory, December 1988.

## Genealogy/Speleology related

“The Calkins Y-DNA,” Calkins World, Spring 2006.

“Rootsweb World Connect Project,” Submitted GEDCOM tree with 150 names. January 2000. Note: since Feb. 2008 I have been involved with [ancestry.com](http://ancestry.com).

“Survey of Reeves Cave and Associated Caves,” 1989.

“The Ancestors and Descendants of Erastus John Fox and his Wife Betsey Lucy Bullen,” Private publication (100 copies), August 1975.

Six major genealogical works in progress: Calkins/Bissell/Thompson/Graves (278 pages), Fox/Bullen/Bergdahl/Mapes (over 426 pages), Blomquist/Schuberg (over 8 pages), Blackmer/Latham/Hall/Fisher (202 pages), Fivash/Wier/Matthew/Glascock (166 pages), Snively/Henning/Mann/Mathews (150 pages).

## **Computer Programs/CD Roms (Card decks?)/Computer Logic Design**

“Chaos,” the 2007–08 Math & Science Center Yearbook, (DVD) with Elvira Baumgartner and students (pending).

“2005–06 Math & Science Center Yearbook,” (CD-ROM) with Shirleen Luttrell and students.

“Ancient Mythologies,” 2004–05 Berrien County Math & Science Center Yearbook (CD-ROM), with Shirleen Luttrell and students.

“How Suite it is,” 2003–04 Berrien County Math & Science Center Yearbook (CD-ROM), with Shirleen Luttrell and students.

“Ecosystems,” 2002–03 Berrien County Math & Science Center Yearbook (CD-ROM), with Shirleen Luttrell and students.

“Xerox Sigma 5/7/9 Emulation,” in JAVA with Madhu Siddalingaiah, Oct. 2002–June 2003.

“For All Seasons,” 2001–02 Berrien County Math & Science Center Yearbook (CD-ROM), with Shirleen Luttrell and students.

“A Fraction in Time,” 2000–01 Berrien County Math & Science Center Yearbook (CD-ROM), with Shirleen Luttrell and students.

“Carpe Diem,” 1991–2000 Berrien County Math & Science Center “Decade” book (CD-ROM), with Shirleen Luttrell and students.

“Keith the Complex Number,” CD-ROM/Web-based Personal Portfolio: December 2000.

“Xerox Sigma 5/7/9 Emulation,” in GCC/DOS with George Plue, Sep. 1997–Feb. 1999.

Communication’s hardware, Sigma 5/7/9 CPU, MOS memory, disk upgrades 1976–1993.

## **Professional Consultation**

Berrien County Intermediate School District, July 1993–present, Summer Algebra I & II, independent study, web-based Publishing, curriculum planning, and other support.

Educational Testing Service, AP Calculus Reader, June 2002–2005, 2007–08.

Software development for Telefile Computer Products, Inc. 1984–1989. Personal work generated \$125,000 in equipment grants for the University. Supervised an additional \$250,000. FORTRAN77 certification, Supervised the porting of C onto Sigma. Ported C, Tele-Edit from CP-V to TCP-R.

“Study of Warner’s Intermittant Sigma Hardware Failures and CP-V Software Slow-downs,” XDX Consulting Report, Berrien Springs MI/Fair Lawn NJ, April 1989.

“Andrews Expert Repairs NASA Computer,” Greenbelt, MD, June 1987.