

## Curriculum Vitae for Ernest S. Croot III

### I. Education.

BS in Mathematics and in Computer science from Centre College, Danville KY in 1994.

Ph.D. in Mathematics from The University of Georgia, 1994-2000.

Post-doctorate position U.C. Berkeley, 2000-2003.

### II. Publications

Work which already appears, is to appear, or has been accepted:

1. *On Non-Intersecting Arithmetic Progressions*, Acta Arith. **110** (2003), no. 3, 233-238.
2. *On a Coloring Conjecture about Unit Fractions*, Ann. of Math. **157** (2003), no. 2, 545-556.
3. *On the Oscillations of Multiplicative Functions Taking Values  $\pm 1$* , J. Number Theory **98** (2003), no. 1, 184-194.
4. *Unit Fractions and the Class Number of a Cyclotomic Field* (with Andrew Granville), J. London Math. Soc. **66** (2002), no. 3, 579-591.
5. *On Unit Fractions with Denominators in Short Intervals*, Acta. Arith **99** (2001), 99-114.
6. *Binary Egyptian Fractions*, with D. Dobbs, J. Friedlander, A. Hetzel, and F. Pappalardi, J. of Number Theory **84** (2000), 63-79.
7. *On Some Questions of Erdős and Graham about Egyptian Fractions*, Mathematika **46** (1999), 359-372.
8. *On Variants of the Larger Sieve*, with C. Elsholtz. Acta Math. Hungar. **103** (2004), 243-254.
9. *On the Distribution of Grand Canonical Density Matrices*, with G. Kin-Lic Chan, P. Ayers, and M. Head-Gordon, J. Statist. Phys. **109** (2002), no. 1-2, 289-299.
10. *The ABC Conjecture and Correctly Rounded Reciprocal Square-Roots* (with Ren-Cang Li and H. J. Zhu), Theoret. Comput. Sci. **315** (2004), 405-417.
11. *On Thin Sets of Primes Expressible as a Ternary Sumset*, Acta Math. Hungar. **106** (2005), 197-226.

12. *Sums of the Form  $1/x_1^k + \cdots + 1/x_n^k$  Modulo a Prime*, INTEGERS **4** (2004).
13. *Long Arithmetic Progressions in Critical Sets*, Jour. Comb. Theory Ser. A **113** (2006), 53-66.
14. *Complexity of Inverting the Euler Function* (with I. Shparlinski and S. Contini), Math. Comp. **75** (2006), 983–996.
15. *A Combinatorial Method for Counting Smooth Numbers in Sets of Integers*, Journal of Number Theory **126** (2007), 237-253.
16. *Long Arithmetic Progressions in Sparse Sumsets* (with I. Ruzsa, and T. Schoen), Combinatorial Number Theory, 157-164, de Gruyter, Berlin, 2007.
17. *The Minimal Number of Three-Term Arithmetic Progressions Modulo a Prime Converges to a Limit*, Canadian Math Bulletin **51** (2008), 47-56.
18. *Smooth Numbers in Short Intervals*, Intern. Jour. of Number Theory **3** (2007), 159-169.
19. *On the Decay of the Fourier Transform and Three-Term Arithmetic Progressions*, J. of Analytic Combinatorics **2** (2007).
20. *Running Time Predictions for Factoring Algorithms* (with A. Granville, P. Tetali, and A. Granville), to appear in Lecture Notes in Computer Science (part of proceedings of ANTS),
21. *Open Problems in Additive Combinatorics* (with S. Lev), CRM Proceedings and Lecture Notes **43** (2007), 207-233.
22. *On a Combinatorial Method for Developing Lucas Sequence Identities*, to appear in Anatomy of the Integers Conference Proceedings.
23. *A New Proof of Roth's Theorem on Arithmetic Progressions* (with O. Sisask), to appear in Proceedings of the AMS.

**Submitted Work:**

24. *Sharp Transitions in Making Squares* (with P. Tetali and A. Granville), submitted.
25. *On the Inventory Cycle Offsetting Problem* (with Kai Huang), submitted to Discrete Optimization.
26. *On the Structure of Sets with Few Three-Term Arithmetic Progressions*, submitted to Combinatorica.
27. *The Structure of Critical Sets for  $\mathbb{F}_p$  Arithmetic Progressions*, submitted to Canadian Journal of Mathematics.

28. *On Sumsets and Spectral Gaps* (with T. Schoen), submitted to Acta Arithmetica.

### **Selected Works in Progress**

29. *Arithmetic Structures in Smooth Subsets of  $\mathbb{F}_p$* ,

<http://front.math.ucdavis.edu/0708.3689>

30. *Subsets of  $\mathbb{F}_p^n$  without Three Term Arithmetic Progressions Have Several Large Fourier Coefficients*,

<http://front.math.ucdavis.edu/0707.1496>

### **III. Awards and Rewards.**

NSF grant DMS-0500863 for the years 2005-2007.

NSF grant DMS-0301282 for the years 2003-2006.

The Robert C. Anderson Memorial Research Award (2002), given by The University of Georgia.

VIGRE Postdoctoral Grant U. C. Berkeley, 2000-2003.

UGA Graduate School Assistantship (research assistantship) 1996-1997, 1997-1998, and 1998-1999.

Graduate School Research Award, 1999.

Solved a \$500 question of P. Erdős and R. L. Graham, which is the Subject of paper 1 above.

### **IV. Conferences Attended and Talks Given.**

9/08 : Invited to attend Special Semester on Ergodic Theory in combinatorics held at MSRI.

6/08 : Invited to attend ANTS VIII (Algorithmic Number Theory Symposium), held this year at Banff.

5/08 : Invited to speak at the Cumberland Combinatorics Conference.

4/08 : Invited to attend and speak at Fields Institute workshop on Additive Combinatorics

12/07 : Contributed talk at PANTS, U. South Carolina (Palmetto Number Theory Series)

9/07-12/07: Invited to Attend IAS special Semester on Additive Combinatorics.

10/06: Invited to give a talk at the Clemson Combinatorics Conference.

1/06-6/06: Special Semester on Number Theory, U. Montreal (invited participant)

10/05: Attended INTEGERS conference (but did not speak).  
 9/05: Invited to give a lecture at Bristol College, England.  
 5/05: Invited to give a lecture at CUNY on Combinatorial and Additive  
 Number Theory.  
 4/05: Invited to give a lecture at AMS meeting at UCSB.  
 11/04: Invited to deliver colloquium at Indiana University.  
 9/04: Invited to Attend Additive Number Theory Conference at the  
 American Institute of Mathematics, Palo Alto, CA.  
 6/04: Attend CNTA VIII conference in Toronto to give a contributed  
 lecture.  
 5/04: Invited to speak at U. of Illinois Number Theory Conference  
 3/04: Invited to speak at Clemson University in the Discrete Math Sem-  
 inar  
 2/04: Invited to speak at the University of Michigan number theory sem-  
 inar  
 11/03: Penn State University (invited to give a lecture)  
 10/03: West Georgia Conference on Combinatorial Number Theory (in-  
 vited to give lecture).  
 2/03: Georgia Institute of Technology (to give a Colloquium)  
 2/03: University of South Carolina (to give a Colloquium)  
 2/03: University of Toronto (to give a Colloquium)  
 5/02: University of Georgia (to receive Robert C. Anderson Prize).  
 1/02: University of British Columbia, Vancouver (to give a colloquium).  
 1/02: AMS meeting in San Diego (to give a talk).  
 12/01: MSRI Conference on L-series (attended).  
 11/01: Santa Clara University (to give a colloquium).  
 9/00: AMS meeting at University of Toronto (to give a talk).  
 8/00: Workshop on Algorithmic Number Theory, MSRI (attended).  
 7/00: Millennial Number Theory Conference held at U. of Illinois, Urbana-  
 Champaign (attended).  
 6/00: SIAM Discrete Mathematics Conference at Minneapolis (to give a  
 talk).  
 9/99: University of Illinois Urbana-Champaign Number Theory Confer-  
 ence (to give a talk).  
 7/99: Erdős and His Mathematics held in Budapest, Hungary (attended).  
 12/98: Western Number Theory Conference held at San Francisco State  
 University (to give a talk).

3/98: SERMON (South Eastern Regional Meet on Numbers) held at University of North Carolina, Greensboro (to give a talk).

12/97: Western Number Theory Conference held at Asilomar in Monterey, California (to give a talk).

4/97: SERMON held at the University of Georgia (to give a talk).

6/96: The National Security Agency Headquarters, Ft. Mead, Maryland (to give a talk).

2/96: DIMACS Conference at Rutgers University (attended).

10/95: Western Number Theory Conference at Asilomar in Monterey, California (to give a talk).

## V. Professional Services.

I have refereed papers submitted to: *Integers*, *The Ramanujan Journal*; several papers submitted to *Journal of Number Theory*; *Electronic Journal of Combinatorics*; *New York Journal of Mathematics*; several ANTS (Algorithmic Number Theory Symposium) Conference Proceedings articles; *Mathematics of Computation*; *Combinatorica*; *Transactions of the AMS*; *Journal of the AMS*; and a few papers for an MSRI conference on combinatorics; various computer science conference proceedings; and, SIAM J. of Comp.

I was co-editor of the problems list for a recent workshop at AIM (American Institute of Mathematics) on additive combinatorics, as well as the co-editor of the problems list at the special semester on additive combinatorics held at Universite de Montreal. I was also a panelist for Algorithmic Number Theory Symposium (2007).

I have twice given talks and helped supervise a statewide math tournament held every year at Georgia Tech.

## VII. Teaching Experience.

Here I list the courses I have taught (or TA'ed) and the times I taught them:

At Georgia Institute of Technology I taught (or am teaching) the following courses:

1. Honors Probability and Statistics (Fall 2003, Fall 2004, Fall 2005).
2. Arithmetic Combinatorics (Spring 2004, Spring 2007).
3. Calculus I (Fall, 2004).

4. Abstract Algebra I (Fall 2005, Spring 2008).
5. Caculus II (Fall, 2006).
6. Abstract Vector Spaces (Fall, 2006).

At U. C. Berkeley I taught the following courses:

1. Linear Algebra (Spring 2003).
2. Complex Analysis (undergrad), Spring 2001 and Fall 2002.
3. Abstract Algebra (undergrad), Spring 2002.
4. Number Theory (undergrad), Fall 2001.
5. Number Theory (graduate), Spring 2001.

At The University of Georgia I taught the following courses (Fall 1994-Spring 2000). I do not have specific dates for any of these:

1. Calculus I.
2. Calculus II.
3. Calculus III.
4. Pre-Calculus.
5. Calculus labs for Calculus I and Calculus II.
6. Math for All Practical Purposes (A math course for Humanities Majors, rated as lower than Pre-Calculus)

### **VIII. Students Supervised.**

1. Henry Yeh (undergrad), summer research U. C. Berkeley.
2. Matthew Powell (undergrad), 2004 senior thesis.
3. Evan Borenstein (ph.d. student), 2004-present.
4. Kai Huang (Master's Student), 2005.
5. Brian Williams (undergrad REU), summer 2005.
6. Brian Swanagan (undergrad REU), summer 2005.
7. Eldon Stegall (undergrad), Fall 2005, Spring 2006.
8. James Anderson (undergrad), Fall 2005.
9. Matthew Peterson (undergrad), Fall 2005.
10. Hai Dang (undergrad), Spring 2006.
11. Randy Heaton (undergrad), Spring 2006.
12. Alexander Block (PURA award, undergrad), Fall 2006.
13. Julian Dawson (undergrad), Fall 2006.
14. Adam Tart (undergrad), Spring 2007.
15. Jon Eisen (REU), Summer 2007.

16. Aisha Arroyo (REU), Summer 2007.
17. Xian Su (undergrad), Spring 2008.