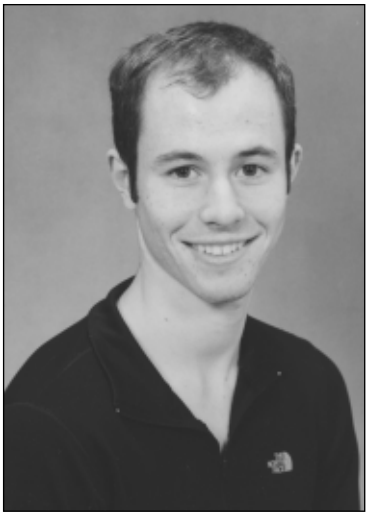
2002 Morgan Prize



Joshua Greene

The 2002 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student was awarded at the Joint Mathematics Meetings in Baltimore in January 2003.

The Morgan Prize is awarded annually for outstanding research in mathematics by an undergraduate student (or students having submitted joint work). Students in Canada, Mexico, or the United States or its possessions are eligible for consideration for the prize. Established in 1995, the prize was endowed by Mrs. Frank Morgan and carries the name of her late husband. The prize is given jointly by the AMS, the Mathematical Association of America (MAA), and the Society for Industrial and Applied Mathematics (SIAM) and carries a cash award of $1,000.

Recipients of the Morgan Prize are chosen by a joint AMS-MAA-SIAM selection committee. For the 2002 prize, the members of the selection committee were: Kelly J. Black, Fan C. Graham, Thomas C. Hales, Svetlana R. Katok, Robert O. Robson, Kris Stewart, and Robert S. Strichartz.

Previous recipients of the Morgan Prize are: Kannan Soundararajan (1995), Manjul Bhargava (1996), Jade Vinson (1997), Daniel Biss (1998), Sean McLaughlin (1999), Jacob Lurie (2000), and Ciprian Manolescu (2001).

The 2002 Morgan Prize was awarded to JOSHUA GREENE. The text that follows presents the selection committee's citation, a brief biographical sketch, and the awardee's response upon receiving the prize.

Citation

The winner of the 2002 Morgan Prize for Outstanding Research by an Undergraduate is Joshua Greene for his work in combinatorics. His prize is based on his paper "A new short proof of Kneser's conjecture", which is to appear in the *American Mathematical Monthly*, and his undergraduate senior thesis "Kneser's conjecture and its generalizations".

Discrete mathematics has often been enriched by the interplay of topology and combinatorics. One such example is Lovász's classic 1978 proof of Kneser's conjecture which states that if the k-element subsets of an n-element set are partitioned into $n-2k+1$ classes, then one of the classes must contain a pair of disjoint subsets. Greene gave a beautiful new short proof without using Gale's theorem on the distribution of points on a sphere. His proof is a gem that is widely admired and has already been included in a forthcoming book by Matousek. In his senior thesis, Greene addresses further associated combinatorial questions and has already provided two new simplified proofs of Schrijver's theorem on chromatic-critical subgraphs of Kneser graphs. His insight in topological combinatorics bypasses traditional technical difficulties in this area, and experts predict that his method will become the standard approach in this rapidly developing area of mathematics.

The committee was impressed by the depth and quality of Greene's research, and by his command of a large body of topology, geometry, and combinatorics required for his work. The quality of his research papers, the enthusiastic letters from his mentors, and the response to his work from many researchers all confirm the outstanding nature of his research.

The committee is proud to award the 2002 Frank and Brennie Morgan Prize to Joshua Greene.

Biographical Sketch

Joshua Greene was born and raised in the sprawling suburbs of Columbia, Maryland. After early unsuccessful attempts to become an artist and pro hockey player, Greene took up an interest in science and mathematics during high school. Beginning in his junior year, he studied astrophysics under the guidance of Dr. Jay Norris at NASA/Goddard Space Flight Center and was named a finalist in the 1998 Westinghouse Science Talent Search for his work there. In the summer of 1998 Greene was a student at the Hampshire College Summer Studies in Mathematics, which sparked his interest in combinatorics, and he returned to teach at the program in 1999 and 2002. He matriculated at Harvey Mudd College in 1998, where he enjoyed a broad education, learning from a dedicated, enthusiastic faculty and graduating with distinction in mathematics in 2002. During college Greene also participated in the Budapest Semesters in Mathematics; Joseph Gallian's Research Experiences for Undergraduates (REU) in Duluth, Minnesota; and the Director's Summer Program. Each program uniquely shaped his research experience and current interests, which include discrete mathematics, number theory, and topology. Greene is currently building houses with Habitat for Humanity in Appalachia through the AmeriCorps service program, and he plans to enter the University of Chicago next fall to pursue a doctorate in mathematics. When he is not studying or communicating mathematics, Greene enjoys hockey, Frisbee, nature, and trying to determine the meaning of life.

Response

I am deeply honored by this distinction. My sincerest thanks extend to Mrs. Frank Morgan for endowing this prize and to the AMS, MAA, and SIAM for sponsoring it and awarding it to me this year. I owe this honor to everyone who has contributed to my research experience in college. Amongst these many people, I specifically thank Joseph Gallian for supervising my work at the Duluth REU; to Liz Pyle for overseeing my work at the Director's Summer Program; to András Gyárfás, whose combinatorics course inspired a substantial portion of my research; to Art Benjamin, Weiqing Gu, and Mike Moody for their ongoing support; and, moreover, to my advisor, Francis Su, for his tireless encouragement and guidance in all matters mathematical and otherwise. Finally, I thank my friends, Kate, and my family for all of their tremendous support.