



THE WILLIAM LOWELL PUTNAM MATHEMATICAL COMPETITION ANNOUNCEMENT OF WINNERS

of the forty-ninth annual competition held on December 3, 1988

WINNING TEAMS

Rank	School	Team Members (in alphabetical order)
1	HARVARD UNIVERSITY	David J. Moews, Bjorn M. Poonen, Constantin S. Teleman
2	PRINCETON UNIVERSITY	Daniel J. Bernstein, David J. Grabiner, Matthew D. Mullin
3	RICE UNIVERSITY	Hubert L. Bray, Thomas M. Hyer, John W. McIntosh
4	UNIVERSITY OF WATERLOO	Frank M. D'Ippolito, Colin M. Springer, Minh-Tue Vo
5	CALIFORNIA INSTITUTE OF TECHNOLOGY	William P. Cross, Robert G. Southworth, Glenn P. Tesler

The first place team receives an award of \$5,000 and each member of the team receives \$250. The awards for second place are \$2500 and \$200; for third place \$1,500 and \$150; for fourth place \$1,000 and \$100; and for fifth place \$500 and \$50.

In each of the following categories, the listing is in alphabetical order.

THE PUTNAM FELLOWS—THE FIVE HIGHEST RANKING INDIVIDUALS

Each receives an award of \$500.

DAVID J. GRABINER	Princeton University
JEREMY A. KAHN	Harvard University
DAVID J. MOEWS	Harvard University
BJORN M. POONEN	Harvard University
RAVI D. VAKIL	University of Toronto

THE NEXT SIX HIGHEST RANKING INDIVIDUALS

Each receives an award of \$250.

WILLIAM P. CROSS	California Institute of Technology
SERGE ELNITSKY	Carleton University
KARL M. WESTERBERG	Carnegie-Mellon University
GLEN T. WHITNEY	Harvard University
SIHAO WU	Yale University
JOSHUA R. ZUCKER	Stanford University

HONORABLE MENTION—TEAMS

BROWN UNIVERSITY	Peter H. Golde, Kevin S. McFarland, David J. Morin
UNIVERSITY OF CALIFORNIA, BERKELEY	I-Lin Kuo, Jordan Lampe, David P. Moulton
CARNEGIE-MELLON UNIVERSITY	Petros I. Hadjicostas, Joseph G. Keane, Karl M. Westerberg
STANFORD UNIVERSITY	John C. Loftin, John A. Overdeck, Joshua R. Zucker
YALE UNIVERSITY	Moses G. Klein, Robert S. Manning, William N. Nelson

HONORABLE MENTION—INDIVIDUALS

THOMAS R. AMOTH, Oregon State University	CHRISTOPHER J. MONSOUR, University of Maryland, College Park
TIBOR BEKE, Armand Hammer United World College	DAVID P. MOULTON, University of California, Berkeley
DANIEL J. BERNSTEIN, Princeton University	MATTHEW D. MULLIN, Princeton University
DAVID T. BLACKSTON, Massachusetts Institute of Technology	DU NGUYEN, University of Ottawa
HUBERT L. BRAY, Rice University	JOHN A. OVERDECK, Stanford University
JACKSON A. BROSS, Massachusetts Institute of Technology	DAVID L. PETRY, University of Oregon
TIMOTHY K. CALLAHAN, University of Chicago	EDWARD R. RATNER, California Institute of Technology
WILLIAM CHEN, Washington University, St. Louis	RAYMOND M. SIDNEY, Harvard University
DAVID COOK, Harvard University	STEPHEN A. SMITH, University of Waterloo
MATTHEW M. COOK, University of Illinois, Urbana-Champaign	ROBERT G. SOUTHWORTH, California Institute of Technology
PETER H. GOLDE, Brown University	COLIN M. SPRINGER, University of Waterloo
THOMAS R. HAGEDORN, Princeton University	CONSTANTIN S. TELEMAN, Harvard University
GRAYDON H. HAZENBERG, University of Waterloo	JOHN S. TILLINGHAST, University of California, Davis
THOMAS M. HYER, Rice University	MINH-TUE VO, University of Waterloo
JOSEPH G. KEANE, Carnegie-Mellon University	ERIC K. WEPSIC, Harvard University
MOSES G. KLEIN, Yale University	CHRISTOPHER S. WILSON, Stanford University
MATTHEW A. KLIMESH, University of Michigan, Ann Arbor	DAVID BRUCE WILSON, Massachusetts Institute of Technology
TAL N. KUBO, Harvard University	JOHN H. WOO, Harvard University
JOHN W. MCINTOSH, Rice University	JAPHETH L. M. WOOD, Washington University, St. Louis

A total of 2,096 students from 360 colleges and universities in Canada and the United States participated in the Competition. There were teams from 257 institutions. More complete details will appear in the American Mathematical Monthly.

Leonard F. Klosinski, Director

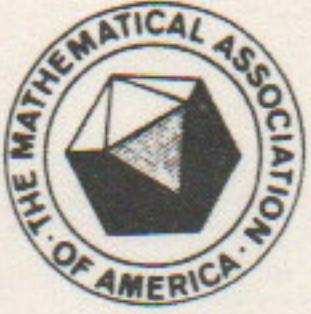
THE WILLIAM LOWELL PUTNAM MATHEMATICAL COMPETITION

University of Santa Clara

Santa Clara, California 95053

March 1, 1989

Telephone: (408) 984-4526



Dear Professor:

Enclosed is a report on your contestants in the 49th Competition and your team rank (if it was in the range 1-150), a list of the top 516 contestants (which you may wish to share with your committee of graduate students), an announcements of winners, and a list of participating schools. Some tables are given below. Your contributions to the Competition are greatly appreciated.

Sincerely yours,

Leonard F. Klosinski

Leonard F. Klosinski, Director

Gerald L. Alexanderson, Associate Director

Loren C. Larson, Associate Director

Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
120	1.5	74	32	52	107	38	259.5	18	1022
119	3	72	33	51	113.5	37	276.5	17	1038
112	4	71	35	50	123	36	288.5	16	1045
110	5	70	37	49	135.5	35	303	15	1056
107	6	69	38	48	143	34	323	14	1076.5
106	7	68	41	47	147.5	33	345	13	1102.5
99	8	67	44.5	46	155	32	369.5	12	1138.5
98	9	66	47.5	45	161.5	31	406	11	1237.5
97	10.5	65	50	44	167.5	30	459.5	10	1496
91	13	63	53	43	175.5	29	503.5	9	1686
90	15.5	62	57.5	42	183.5	28	530	8	1696.5
89	17.5	61	63.5	41	192.5	27	549.5	7	1701.5
87	19	60	69.5	40.9	199.5	26	563.5	6	1703
86	20.5	59	74.5	40.8	202.5	25	584.5	5	1705.5
85	22	58	80	40.7	204	24	611	4	1709
84	24	57	85.5	40.6	205	23	637.5	3	1712.5
81	26	56	92	40.5	206	22	669	2	1732
78	27.5	55	96.5	40.4	207	21	744.5	1	1782.5
77	29	54	98	40	216.5	20	885	0	1956
76	30.5	53	101	39	237	19	988.5		

FREQUENCY DISTRIBUTION OF PROBLEM SCORES OF THE TOP 207 CONTESTANTS

	A-1	A-2	A-3	A-4	A-5	A-6	B-1	B-2	B-3	B-4	B-5	B-6	Total
10	202	174	42	45	32	59	176	88	20	17	9	38	902
9	0	1	17	29	8	14	25	38	16	1	0	9	158
8	0	7	10	2	4	10	0	30	17	0	10	4	94
7	0	1	0	2	0	7	0	0	2	0	1	4	17
6	0	0	0	1	0	0	0	0	0	0	0	24	25
5	0	0	0	25	0	0	0	0	0	0	0	8	33
4	0	0	0	11	0	0	0	0	0	0	0	0	11
3	0	3	6	0	1	0	0	0	0	0	0	5	15
2	4	3	5	3	7	5	1	26	52	3	1	5	115
1	2	0	3	3	96	0	1	4	33	2	2	1	147
0	0	15	34	25	9	21	1	18	27	73	45	17	285
blank	0	4	91	62	51	92	4	4	41	112	140	93	694