

ANNOUNCEMENT OF WINNERS

of the eighty-fourth competition held on December 2, 2023

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 \$2,500.

Ankit Bisain	Massachusetts Institute of Technology
Jiangqi Dai	Massachusetts Institute of Technology
Papon Lapate	Massachusetts Institute of Technology
Brian Liu	Massachusetts Institute of Technology
Luke Robitaille	Massachusetts Institute of Technology

THE NEXT ELEVEN HIGHEST-RANKING INDIVIDUALS

Each receives an award of \$1,000.

Mingyang Deng	Massachusetts Institute of Technology
Andrew Gu	Harvard University
Michael Li	University of Toronto
Sean Li	Massachusetts Institute of Technology
Derek Liu	Massachusetts Institute of Technology
Maximus Lu	Massachusetts Institute of Technology
Zhao Yu Ma	Massachusetts Institute of Technology
Aloysius Ng	Massachusetts Institute of Technology
Eric Shen	Massachusetts Institute of Technology
Tomasz Slusarczyk	Massachusetts Institute of Technology
Kaixin Wang	Duke University

THE NEXT TEN HIGHEST-RANKING INDIVIDUALS

Each receives an award of \$250.

Reagan Choi Massachusetts Institute of Technology

Kevin Cong Harvard University

Rishabh Das Massachusetts Institute of Technology

Arav Karighattam Harvard University

Huaye Lin Massachusetts Institute of Technology

Eric Shen Harvard University

Brandon Wang
William Wang
Daniel Xia
Massachusetts Institute of Technology
Massachusetts Institute of Technology
Massachusetts Institute of Technology
Massachusetts Institute of Technology

Rowechen Zhong Massachusetts Institute of Technology

HONORABLE MENTION — INDIVIDUALS (RANKS 26-100)

Jack Albright, Stanford University

Serena An, MIT

Nithid Anchaleenukoon, MIT Gradin Anderson, Brigham Young

University

Asha Basu, McGill University

Daniel Benavides, MIT

Tomas Cantu, MIT

Ruben Carpenter, Yale University

Tristan Chaang, MIT Alvin Chen, MIT Brandon Chen, MIT Jeffrey Chen, MIT

Quanlin Chen, Stanford University

Raphael Dylan Dalida, MIT

Sanjana Das, MIT

Caleb Dastrup, Brigham Young University Robert Dragomirescu, Stanford University

Yundi Duan, University of Waterloo

Raymond Feng, MIT Gopal Goel, MIT Ram Goel, MIT Alex Gu, MIT

Anshul Guha, Yale University

Thomas Guo, MIT

Paul Hamrick, University of North

Carolina, Chapel Hill

Daniel Hong, MIT Vidur Jasuja, MIT

Benjamin Kang, MIT

Richard Kang, University of Waterloo Aaron Alvarado Kristanto Julistiono, MIT Antoine Labelle, McGill University Tuong Le, University of Michigan

Daeho Lee, MIT Zhening Li, MIT Jason Liu, MIT Evan Lu, MIT

Andrei Mandelshtam, Stanford University

Edis Memis, Harvard University

Kevin Min, MIT

Josiah Moltz, Binghamton University

SUNY

Holden Mui, MIT

Atul Shatavart Nadig, MIT

Atharva Pathak, Princeton University Hung Pham, University of Chicago

Gregory Pylypovych, MIT

Pitchayut Saengrungkongka, MIT Eric Yuang Shao, Columbia University Matthew Snodgrass, Carnegie Mellon

University Maxwell Sun, MIT Rui Sun, MIT Kenta Suzuki, MIT

Adam Tang, Harvey Mudd College Vincent Trang, University of Maryland,

College Park
Alan Vladimiroff, MIT
Mateja Vukelic, MIT
Albert Wang, MIT
Anthony Wang, MIT
Frank Wang, MIT
Jaedon Whyte, MIT

Gabriel Wu, Harvard University

Kevin Wu, MIT Yichen Xiao, MIT Edward Xiong, MIT

Alex Xu, University of Michigan

Daniel Xu, MIT Justin Yu, MIT

Daniel Yuan, University of Maryland,

College Park William Yue, MIT

Franklin Zhang, University of Illinois

Hankai Zhang, MIT Ethan Zhou, MIT

Zixiang (Peter) Zhou, MIT

Isaac Zhu, MIT Isabella Zhu, MIT

ELIZABETH LOWELL PUTNAM PRIZE

She receives an award of \$1,000.

Isabella Zhu

Massachusetts Institute of Technology

WINNING TEAMS

Rank	School	Team Members (in alphabetical order)
1	Massachusetts Institute of Technology	Ankit Bisain Papon Lapate Luke Robitaille
2	Harvard University	Kevin Cong Andrew Gu Arav Karighattam
3	Duke University	Erick Jiang James Rydell Kaixin Wang
4	Stanford University	Jack Albright Quanlin Chen Andrei Mandelshtam
5	University of Toronto	Ethan Bottomley-Mason Michael Li Zhiyuan Li

The institution with the first-place team receives an award of \$25,000, and each member of the team receives \$1,000. The team and member awards for second place are \$20,000 and \$800, respectively; for third place, \$15,000 and \$600; for fourth place, \$10,000 and \$400; and for fifth place, \$5,000 and \$200.

HONORABLE MENTION — TEAMS (RANKS 6-10)

Listed by university in alphabetical order. Where four students are listed, there was a tie for third-highest individual score at that institution.

School Team Members (in alphabetical order)

Brigham Young University Gradin Anderson

Caleb Dastrup Ethan Katz

Princeton University Benjamin Lemkin

Austen Mazenko Atharva Pathak

University of Maryland, College Park Omar Habibullah

Andrew Parker Vincent Trang Daniel Yuan

University of Michigan Tuong Le

Alex Xu

Yuchong Zhang

University of Waterloo Andrew Dong

Yundi Duan Richard Kang

Yale University Ruben Carpenter

Anshul Guha Michael Ying

PUTNAM PROBLEMS COMMITTEE:

Brian Hunt, University of Maryland, College Park Karl Mahlburg (Chair), Susquehanna International Group Greta Panova, University of Southern California

CONTRIBUTORS OF ADDITIONAL PROBLEMS FOR THE COMPETITION:

Gabriel Carroll, University of Toronto
David Grabiner, Department of Defense
Darij Grinberg, Drexel University
Michael Larsen, University of Indiana
Richard Stanley, Massachusetts Institute of Technology and University of Miami

COMPETITION LEADERSHIP:

Daniel Ullman (Director), George Washington University Paul Zeitz (Associate Director), University of San Francisco

SCORE-TO-RANK CORRESPONDENCE

A participant is said to have rank n if n-1 participants scored higher.

Score	Rank										
98	1	70	21	55	61	41	172	27	542	13	1206
89	2	68	22	54	62	40	205	26	565	12	1311
86	3	67	24	53	64	39	231	25	580	11	1434
85	4	66	27	52	78	38	251	24	606	10	1611
83	6	65	29	51	89	37	264	23	644	9	2201
81	7	64	34	50	95	36	279	22	706	8	2566
79	9	63	37	49	101	35	286	21	769	7	2677
78	10	62	40	48	109	34	306	20	854	6	2695
77	12	61	41	47	118	33	321	19	955	5	2698
76	13	60	43	46	125	32	348	18	1028	4	2703
75	14	59	49	45	129	31	378	17	1085	3	2713
74	17	58	52	44	135	30	435	16	1109	2	2824
73	19	57	54	43	144	29	480	15	1136	1	2946
71	20	56	56	42	154	28	517	14	1168	0	3054

FREQUENCY DISTRIBUTION OF PROBLEM SCORES OF THE TOP 516 CONTESTANTS

Score	A 1	A2	А3	A4	A 5	A6	B1	B2	В3	B4	B5	В6
10	426	368	7	31	10	16	373	239	80	8	21	1
9	68	27	13	18	3	0	42	19	12	3	10	0
8	10	81	4	34	13	1	20	5	23	7	4	0
7	0	5	1	20	0	0	3	0	0	6	0	0
6	0	3	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	17	0	0	0	0	0	0	11	0	0
3	2	10	2	0	0	0	44	1	33	15	0	0
2	2	2	15	68	36	26	17	8	51	20	18	0
1	1	0	230	23	9	62	4	41	14	36	72	1
0	7	6	105	45	52	73	9	118	92	109	77	27
NA	0	14	122	277	393	338	4	85	211	301	314	487

STUDENTS RANKED 101-200

Listed by university in alphabetical order

Amherst College, Amherst, MA

William Han Alan Li

Arizona State University, Tempe, AZ

Sahaj Rastogi

Brown University, Providence, RI

Luke Choi Maximus Liu

Bucknell University, Lewisburg, PA

Skyler Le Ahn Tran

California Institute of Technology, Pasadena, CA

Eduardo Henrique Rodrigues do Nascimento

Carnegie Mellon University, Pittsburgh, PA

Siyuan Chen Advait Nene Ishin Shah Soren Dupont Daniel Park Gene Yang Joseph Kalarickal Sam Rosenstrauch James Yang

Colby College, Waterville, ME

Thor Gabrielsen

Columbia University, New York City, NY

Nikhil Mudumbi

Cornell University, Ithaca, NY

Rishi Gujjar

Duke University, Durham, NC

Erick Jiang James Rydell

Harvard University, Cambridge, MA

Tanav Choudhary Kevin Du Srihari Ganesh William Hu Jacob Paltrowitz Daniel Sheremeta Haozhe Yang

Harvey Mudd College, Claremont, CA

Tiger Che Alan Kappler

Haverford College, Haverford, PA

William Bender

Hillsdale College, Hillsdale, MI

Andrew Schmidt

Johns Hopkins University, Baltimore, MD

Minjae Kim

Massachusetts Institute of Technology, Cambridge, MA

Aleksandr Abelyan Benson Zhan Li Lin Holden Watson Joseph Camacho Mohamed Wacyl Meddour Christopher Wu Tony Wu Richard Chen Nilay Mishra Akash Das **Unubold Munkhbat** Max Xu Benjamin Epstein Tiago Oliveira Marques Binwei Yan Victor Yin Chirag Falor Pravalika Putalapattu Arnav Goel **Edward Qiao** Ziqian Zhong Nitin Kumar **Espen Slettnes** Jeremy Zhou David Lee Teimurazi Toloraia Adam Zweiger

Daniel Li Karthik Vedula

Oberlin College, Oberlin, OH

Deron Lessure

Princeton University, Princeton, NJ

Benjamin Lemkin Austen Mazenko Ben Zenker

Rose-Hulman Institute of Technology, Terre Haute, IN

Connor Lane

Rutgers, The State University of New Jersey, New Brunswick, NJ Eric Yang

Stanford University, Stanford, CA

Michael Cho Kevin Li Matthew Riedman Karthik Seetharaman Ethan Zhang

University of Alabama, Tuscaloosa, AL

Jacob Glidewell

University of California, Berkeley, CA

Theodore Lysek Noah Mart Jianzhi Wang

University of California, Los Angeles, CA

Jason Liu Sumith Nalabolu Diana Tolu

University of California, Santa Barbara, CA

Pico Gilman

University of Chicago, Chicago, IL

Henry Cafaro

University of Florida, Gainesville, FL

Jake Frazer Samuel Kim

University of Illinois, Urbana-Champaign, IL

Adrian Calinescu

University of Massachusetts, Amherst, MA

Aditya Khurmi Son Pham

University of Minnesota, Minneapolis, MN

Nathan Mihm

University of Pennsylvania, Philadelphia, PA

David Kogan Lucas Wu Vincent Zhang

University of Rochester, Rochester, NY

Tran Duy Anh Le

University of Toronto, Toronto, ON, Canada

Ethan Bottomley-Mason Rizky Rajendra Ananta Dewa Zhiyuan Li

University of Virginia, Charlottesville, VA

Utkarsh Goyal Declan Stacy

University of Waterloo, Waterloo, ON, Canada

Andrew Dong

University of Wisconsin, Madison, WI

Jonah Guse

Yale University, New Haven, CT

Deyuan Li Vismay Sharan Chun Yeung Wong Michael Ying

STUDENTS RANKED 201-500

Listed by university in alphabetical order

Amherst College, Amherst, MA

Alexandre van Lidth Derek Zhang Wenshi Zhao

Arizona State University, Tempe, AZ

Riley Knutson

Augustana University, Sioux Falls, SD

Tianyi Lu

Baruch College, New York, NY

Danyil Blyschak

Brandeis University, Waltham, MA

Benjamin Kamen Maximilien Shepard

Brigham Young University, Provo, UT

Ethan Katz

Brigham Young University, Laie, HI

Erdenebileg Erdenebat

Brown University, Providence, RI

Ethan Bove An Cao Nathan Smith

California Institute of Technology, Pasadena, CA

Toyesh Jayaswal Joey Litvin Justin Luo Yakov Shalunov

Carnegie Mellon University, Pittsburgh, PA

Alan Abraham Owen Lalis Mario Tutuncu-Macias

Kevin CaoYuelin LiDaniel WangYijun ChenXavier LienEric WangMatthew CohenStanley LiuXinyi WangRohit DasanoorDaniel MaiClaire Xu

Hari Desikan Faraz Mirza Chi Hung Anthony Yip

Russell Emerine Ina'nis Ninomae Justin Yoo
Justin Hsieh Eric Oh Kevin You
Junwei Huang Giacomo Rizzo Eric Zheng
Bowen Jiang Parth Shastri Andy Zhu

Sebastian Kumar Lohith Tummala

Columbia University, New York City, NY

Hyoungjoon Yoo

Cornell University, Ithaca, NY

Aruni Chenxi Lyndon Hess Andrii Nykyforchyn Abhijeet Saha Lucas Sandleris Ruogu Zhang

Davidson College, Davidson, NC

Kenan Wood

Duke University, Durham, NC

Harry Chen Vincent Li
Angikar Ghosal Nathan Nguyen

Hung Le Samuel Orellana Mateo

Akshar Yeccherla

Georgia Institute of Technology, Atlanta, GA

Joseph Campbell

Christian Engman

Andrew Shi

Lawrence Zhou

Harvard University, Cambridge, MA

Sebastian Attlan Radu Andrei Lecoiu Annabel Ma Elliot Chin Jerry Liang Easton Singer Dhruv Goel Kevin Liu Walden Yan Sophie Zhu

Harvey Mudd College, Claremont, CA

Megan Davi Daniel Vargas Kai Mawhinney Luke Wang

Haverford College, Haverford, PA

Guilherme Zeus Dantas e Moura Hongyi Zhang

Johns Hopkins University, Baltimore, MD

Yash Permalla

Linfield University, McMinnville, OR

Brendan Perez

Massachusetts Institute of Technology, Cambridge, MA

Carlos Alvarado Yelyzaveta Horokh Timothy Qian Adithya Balachandran Tristan Kay Nathan Sheffield Luka Bulic Braculi Evan Kim Danil Sibgatullin Li Xuan Tan Benjamin Chen Alan Lee Dev Chheda Andrew Lee Ray Tang Jacob David Rupert Li Grace Tian **Evelyn Lianto** Fernando Dominguez **Andrew Tung** Castaneda Andrew Liu Zifan Wang Mohammed Ehab Andrew Wen Brandon Lou Jonathan Fei Ghaura Mahabaduge Alina Yang Csilla Fulop Max Misterka Jason Yang Abhinav Goel Ritam Nag Ryan Yunrui Yang Daniel Ochoa Chon Hou Ye Oias Gulati Aaron Guo Joseph Othman Andrew Yuan Joshua Guo Mohammed Othman Fedir Yudin John Gupta-She Shavan Pardis Claire Zhang Paul Gutkovich Rishab Parthasarathy Kevin Zhao Garrett Heller Richard Qi Yuxuan Zhena Sebastian Zhu

McGill University, Montreal, QC, Canada

Tommy He Roland Killian Alexander Koran

McMaster University, Hamilton, ON, Canada

Hakim Temacini

Miami University, Oxford, OH

Hiep Trinh

Missouri University of Science and Technology, Rolla, MO

Braden Stillmaker

Moravian University, Bethlehem, PA

Geoffrey Kleinberg

New York University, New York, NY

Samuel Esteban Siyong Liu

Northeastern University, Boston, MA

Toby Busick-Warner

Northern Illinois University, DeKalb, IL

Colin Guy

Pennsylvania State University, State College, PA

Vladyslav Myskiv

Princeton University, Princeton, NJ

Jerry Han Julian Shah Kareem Jaber Daniel Yang Rodrigo Porto Charles Yu

Purdue University, Lafayette, IN

William Lin

Rice University, Houston, TX

Ayooluwanitemi Aitokhuehi Stian Du Preez Fangqi Guo

Rose-Hulman Institute of Technology, Terre Haute, IN

Benjamin Lyons

Rutgers, State University of New Jersey, New Brunswick, NJ

Justin Kim Andrew Krapivin Rajat Peddinti

Simon Fraser University, Burnaby, BC, Canada

Oscar Lautsch

Stanford University, Stanford, CA

Carlo Baronio Eli Meyers Peter Westbrook
Michael Doboli Bradley Moon Anthony Zhan
John Hlavka Rahul Thomas

Stony Brook University, Stony Brook, NY

William Lee

Swarthmore College, Swarthmore, PA

Kai Williams

Texas A&M University, College Station, TX

Phuoc Anh Kha Le Minh Nguyen

University of Alabama, Huntsville, AL

Zachary Nunez

University of Alabama, Tuscaloosa, AL

Vu Minh Khang Ho

University of Arizona, Tucson, AZ

Vadim Bernshteyn Balaaji Reddy Nagireddy

University of British Columbia, Vancouver, BC, Canada

Oakley Edens Jiang Xu Wan

University of California, Berkeley, CA

Yash Aggarwal Andrew Huang Youngmin Park
Daniel Ao Aathreya Kadambi Shreyas Ramamurthy
Aditya Baireddy Andrew Lee Robin Sharif
Ralph Cao Bradley Louie Saito Brian Sui
Preston Fu Justin Park Dylan Xu

Robert Yang

University of California, Davis, CA

Sean O

University of California, Los Angeles, CA

Arvin Ding Akash Madiraju Surya Subbarao Stephen Kelman Ethan Peng Zachary Tu Henry Lindhurst Gary Song Alan Wu

University of California, San Diego, CA

Mark Barbone Kenji Gunawan Elizabeth Teryoshin

University of California, Santa Barbara, CA

Ashwin Anand Sagnik Biswas
Victor Bernal Ramirez Ajay Manneth
Anikait Mundhra

University of Chicago, Chicago, IL

Claudio Bastiani-Fonck Cong Hung Le Tran
Cameron Chang Ryan O'Farrell
Derek Zhu

University of Florida, Gainesville, FL

Samuel Cohen Alejandro Leon

University of Hawaii, Manoa, HI

Adam Inamasu

University of Illinois, Urbana-Champaign, IL

Brendan Biernacki Yuuki Sawanoi

University of Kansas, Lawrence, KS

Liam McKinney

University of Manitoba, Winnipeg, MB, Canada

Nolan Coughlan

University of Maryland, College Park, MD

Omar Habibullah Isaac Mammel
Clarence Lam Adam Melrod
Andrew Parker

University of Massachusetts, Amherst, MA

Minh Do

University of Michigan, Ann Arbor, MI

Qimeng Fang Bohang Yu Alvin Li Yuchong Zhang Jaiden Shin

University of Minnesota, Minneapolis, MN

Andrew Hale Luke Patefield
Jeffrey Hu Dinh Quan Tran

Andrew Mou

University of New Mexico, Albuquerque, NM

Franklin Pezzuti Dyer

University of North Carolina, Chapel Hill, NC

Marvin Koonce

University of Oklahoma, Norman, OK

Jacob Norris

University of Pennsylvania, Philadelphia, PA

Benjamin Lee

Robin Murugadoss Jonathan Pei
Allan Zhang

University of Texas, Dallas, TX

Evan Bailey Suraj Mathashery

University of Toronto, Toronto, ON, Canada

Robert Chung Mukhammadrizo Madjidov Petrus Deon Pranoto Benjamin Edidin Luke McCutcheon Haonan Zhao

Alptekin Goksan

University of Virginia, Charlottesville, VA

Michael Fatemi Nicholas Winschel

University of Washington, Seattle, WA

Matthew Shang Nelson Sun

University of Waterloo, Waterloo, ON, Canada

Liam Benoit Max Jung Christopher Trevisan Arthur Bright Hanson Liu Mars Xiang Jason Fand Alexander Tianze Xu Jacob Yan Valentio Iverson Monteith-Pistor Adam Jelinsky Aarvam Sharma Michael Yang Max Jiang Senthan Sivatharan Yingshang Zhao Tiangi Jiang Gary Sun Kaicheng Zhu

University of Wisconsin, Madison, WI

Haran Mouli

Vanderbilt University, Nashville, TN

Serhii Mytsyk

Virginia Polytechnic Institute and State University, Blacksburg, VA

Grant Mullins

Washington and Lee University, Lexington, VA

Wesley Mazzucco

Wesleyan University, Middletown, CT

Boqing Deng Ze Fan

Williams College, Williamstown, MA

Jonathan Geller Yuan Qiu

Yale University, New Haven, CT

Samvel Antonyan	Lejun Deng	Andrew Milas
Jacob Berg	Austin Feng	William Ning
Howard Dai	Seojun Lee	Andrei Alexandru Parfeni
William Dai	Matthew Li	Zhemin Shao
Xiang Rong Dai	Patrick Lu	Kevin Wu
		Stephen Yin

TOP TEAMS BY MAA SECTION

Teams listed in order of team score. Where four institutions are listed, there was a tie for third-highest team score in that section.

Allegheny Mountain Section

Carnegie Mellon University
The Pennsylvania State University
University of Pittsburgh

Eastern PA & Delaware Section Section

University of Pennsylvania Haverford College Bucknell University

Florida Section

University of Florida Florida International University Florida Atlantic University

Golden Section

Stanford University University of California, Berkeley University of California, Davis

Illinois Section

University of Chicago University of Illinois Northwestern University

Indiana Section

Purdue University Rose–Hulman Institute of Technology University of Notre Dame

Intermountain Section

Brigham Young University Utah State University University of Utah

Iowa Section

Iowa State University University of Iowa Dordt University Grinnell College

Kansas Section

University of Kansas Kansas State University

Witchita State University

Kentucky Section

University of Louisville Campbellsville University University of Kentucky

Louisiana-Mississippi Section

Louisiana State University University of Louisiana, Lafayette Tulane University University of Mississippi

Maryland-DC-Virginia Section

University of Maryland, College Park University of Virginia Johns Hopkins University

Metro New York Section

Columbia University
New York University
Stony Brook University SUNY

Michigan Section

University of Michigan Michigan State University Hillsdale College

Missouri Section

Washington University in St. Louis MIssouri University of Science and Technology Saint Louis University

Nebraska & Southeast South Dakota Section

University of Nebraska, Lincoln University of Nebraska, Omaha Hastings College

New Jersey Section

Princeton University Rutgers, the State University of New Jersey Rowan University

North Central Section

University of Minnesota, Twin Cities University of Manitoba Carleton College

Northeastern Section

Massachusetts Institute of Technology

Harvard University Yale University

Ohio Section

Oberlin College Case Western Reserve University Ohio State University

Oklahoma-Arkansas Section

University of Oklahoma Oklahoma State University Oral Roberts University

Pacific Northwest Section

University of Washington, Seattle Simon Fraser University Oregon State University

Rocky Mountain Section

Colorado School of Mines Colorado State University, Fort Collins University of Wyoming

Seaway Section

University of Toronto University of Waterloo McGill University

Southeastern Section

Duke University University of Alabama Georgia Institute of Technology

Southern California-Nevada Section

Harvey Mudd College University of California, Santa Barbara University of California, Los Angeles

Southwestern Section

Arizona State University, Tempe University of Arizona Embry-Riddle Aeronautical University, Prescott

Texas Section

University of Texas, Dallas Rice University Texas A&M University

Wisconsin Section

University of Wisconsin, Madison University of Wisconsin, Stevens Point University of Wisconsin, Milwaukee