



William Lowell
PUTNAM
Mathematical Competition

ANNOUNCEMENT OF WINNERS

of the eighty-third competition held on December 3, 2022
(Revised, May 2024)

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.

Mingyang Deng	Massachusetts Institute of Technology
Papon Lapate	Massachusetts Institute of Technology
Brian Liu	Massachusetts Institute of Technology
Luke Robitaille	Massachusetts Institute of Technology
Daniel Zhu	Massachusetts Institute of Technology

THE NEXT ELEVEN HIGHEST-RANKING INDIVIDUALS

Each receives an award of \$1,000.

Vincent Bian	Massachusetts Institute of Technology
Quanlin Chen	Stanford University
Andrew Gu	Harvard University
Kevin Liu	Massachusetts Institute of Technology
Zhao Yu Ma	Massachusetts Institute of Technology
Holden Mui	Massachusetts Institute of Technology
Carl Schildkraut	Massachusetts Institute of Technology
Anton Trygub	Massachusetts Institute of Technology
Yuxing Xia	Massachusetts Institute of Technology
Brandon Wang	Massachusetts Institute of Technology
Binwei Yan	Massachusetts Institute of Technology

THE NEXT TEN HIGHEST-RANKING INDIVIDUALS

Each receives an award of \$250.

Yomou Fei	Columbia University
Raymond Feng	Massachusetts Institute of Technology
Isaac Hellerman	University of Dallas
Daniel Hong	Massachusetts Institute of Technology
Victor Rong	Massachusetts Institute of Technology
Pitchayut Saengrungkongka	Massachusetts Institute of Technology
Tomasz Slusarczyk	Massachusetts Institute of Technology
Pranjal Srivastava	Massachusetts Institute of Technology
William Yue	Massachusetts Institute of Technology
Stan Zhang	Massachusetts Institute of Technology

HONORABLE MENTION — INDIVIDUALS (RANKS 26-100)

Gradin Anderson, Brigham Young University	Antoine Labelle, McGill University	Eric Sun, MIT
Adam Ardeishar, MIT	Clarence Lam, University of Maryland, College Park	Maxwell Sun, MIT
Daniel Benavides, MIT	Jay Leeds, Swarthmore College	Joel Junyao Tan, MIT
Nikoloz Birkadze, MIT	Daniel Li, MIT	Colin Tang, MIT
Ankit Bisain, MIT	Michael Li, University of Toronto	Rahul Thomas, Stanford University
Andres Buritica Monroy, MIT	Jason Liu, MIT	Teimurazi Toloraia, MIT
Tomas Cantu, MIT	Steven Liu, MIT	Zachary Tu, University of California, Los Angeles
Daniel Carter, Princeton University	Yijia Liu, Duke University	Noah Walsh, MIT
Brandon Chen, MIT	Isaac Mammel, University of Maryland, College Park	Albert Wang, MIT
Reagan Choi, MIT	Austen Mazenko, Princeton University	Samuel Wang, MIT
Kevin Cong, Harvard University	Andrew Milas, Yale University	William Wang, MIT
Rishabh Das, MIT	Aleksa Milojevic, Princeton University	Jaedon Whyte, MIT
Sanjana Das, MIT	Kevin Min, MIT	Benjamin Wright, MIT
Gopal Goel, MIT	Daniel Monroe, University of California, San Diego	Gabriel Wu, Harvard University
Thomas Guo, MIT	Haran Mouli, University of Wisconsin, Madison	Daniel Xia, MIT
Garrett Heller, MIT	Robin Murugadoss, University of Pennsylvania	Alex Xu, University of Michigan
Andrew Huang, University of California, Berkeley	Ritam Nag, MIT	Justin Yu, MIT
Vincent Huang, MIT	Rishab Parthasarathy, MIT	Runze Yu, University of California, Los Angeles
Mohit Hulse, MIT	Gregory Pylypovych, MIT	Daniel Yuan, University of Maryland, College Park
Vidur Jasuja, MIT	Brian Reinhart, MIT	Fedir Yudin, MIT
Tianze Jiang, MIT	Matthew Riedman, Stanford University	Brad Zhang, Carnegie Mellon University
Benjamin Kamen, Brandeis University	Paramuth Samuthrsindh, MIT	William Zhao, MIT
Benjamin Kang, MIT	Eric Shen, Harvard University	Rowechen Zhong, MIT
Arav Karighattam, Harvard University	Danil Sibgatullin, MIT	Ziqian Zhong, MIT
Ashton Keith, Binghamton University		Zixiang (Peter) Zhou, MIT
Dain Kim, MIT		Isaac Zhu, MIT
John Ko, MIT		
Aaron Alvarado Kristanto Julistiono, MIT		

ELIZABETH LOWELL PUTNAM PRIZE

She receives an award of \$1,000.

Binwei Yan

Massachusetts Institute of Technology

WINNING TEAMS

Rank	School	Team Members (in alphabetical order)
1	Massachusetts Institute of Technology	Mingyang Deng Luke Robitaille Daniel G. Zhu
2	Harvard University	Kevin Cong Andrew Gu Arav Karighattam
3	Stanford University	Quanlin Chen Matthew Riedman Rahul Thomas
4	University of Maryland, College Park	Clarence Lam Isaac Mammel Daniel Yuan
5	Princeton University	Daniel Carter Austen Mazenko Aleksa Milojevic

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

School	Team Members (in alphabetical order)
Carnegie Mellon University	Adam Bertelli Howard Halim Brad Zhang
Columbia University	Ryan Anselm Hao Cui Yumou Fei Geoffrey Wu
University of California, Berkeley	Andrew Huang Theodore Lysek Jianzhi Wang
University of California, Los Angeles	Varit Chantranuwathana Zachary Tu Runze Yu
University of Toronto	Alptekin Can Goksan Lucas Jacobs Michael Li Jing Wang

PUTNAM PROBLEMS COMMITTEE:

Brian Hunt, University of Maryland, College Park
Karl Mahlburg, Susquehanna International Group
Richard Stong (Chair), Center For Communications Research

CONTRIBUTORS OF ADDITIONAL PROBLEMS FOR THE COMPETITION:

Gabriel Carroll, University of Toronto
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	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
101	1	72	25	57	65	41	135	27	317	13	675
96	2	71	27	56	69	40	129	26	334	12	716
91	3	70	28	55	76	39	147	25	348	11	787
89	4	69	30	54	81	38	163	24	366	10	863
86	6	68	34	52	83	37	177	23	380	9	969
82	8	67	36	50	86	36	188	22	402	8	1038
80	9	66	37	49	94	35	196	21	427	7	1088
79	12	65	40	48	100	34	199	20	455	6	1134
78	14	64	41	47	105	33	210	19	499	5	1186
77	17	63	45	46	109	32	219	18	546	4	1241
76	18	61	51	45	112	31	234	17	576	3	1314
75	21	60	54	44	120	30	256	16	600	2	1452
74	23	59	57	43	124	29	277	15	623	1	1666
73	24	58	63	42	129	28	296	14	648	0	2135

FREQUENCY DISTRIBUTION OF PROBLEM SCORES OF THE TOP 545 PARTICIPANTS

Score	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6
10	141	114	204	29	6	1	288	107	103	36	15	1
9	91	38	24	100	0	1	83	83	28	29	6	0
8	54	23	32	3	2	0	41	57	4	15	1	0
7	12	27	0	4	1	0	13	38	0	0	0	0
6	4	23	0	2	0	0	0	24	0	0	1	0
5	0	5	0	7	0	0	0	19	0	0	1	0
4	0	8	0	5	0	0	0	19	0	0	33	0
3	1	5	0	1	0	0	13	20	0	0	16	0
2	49	8	20	12	20	4	13	21	50	6	1	3
1	44	7	6	73	68	2	12	32	49	55	10	6
0	78	124	27	60	112	41	42	38	90	96	100	113
NA	71	163	232	249	336	496	40	87	221	308	361	422

STUDENTS RANKED 101-200

Listed by university in alphabetical order

Amherst College, Amherst, MA

William Han
Alan Li

Augustana University, Sioux Falls, SD

Tianyi Lu

Brigham Young University, Provo, UT

Thomas Draper
Quinlan Leishman

Brown University, Providence, RI

An Cao
Ethan Bove

California Institute of Technology, Pasadena, CA

Yakov Shalunov

California Polytechnic State University, San Luis Obispo, CA

Marion Lara

Carnegie Mellon University, Pittsburgh, PA

Adam Bertelli	Edward Hou	Aresh Pourkavoos
Rajeev Godse	Joseph Kalarickal	Mario Tutuncu-Macias
Howard Halim	Lucas Liu	Kevin Zhou
Alexander Heckett	Eric Oh	

Columbia University, New York City, NY

Geoffrey Wu

Cornell University, Ithaca, NY

Sikai Shen

Duke University, Durham, NC

Harry Chen	James Rydell
Nathan Nguyen	Zeyu Shen

Harvard University, Cambridge, MA

Daniel Salkinder
Walden Yan
Alexander Zhang

Harvey Mudd College, Claremont, CA

Adam Tang

Haverford College, Haverford, PA

Guilherme Zeus Dantas e Moura

Lucas Nelson

Indiana University—Purdue University Indianapolis, Indianapolis, IN

Croix Gyurek

Massachusetts Institute of Technology, Cambridge, MA

Adithya Balachandran

Andrew Lee

Aleksandre Saatashvili

Akash Das

Daniel Li

Tristan Shin

Nishant Dhankhar

Rupert Li

Kenta Suzuki

Owen Dugan

Ryan Li

Li Xuan Tan

Mason Fang

Sean Li

Zifan Wang

Alex Gu

Jeffrey Lu

Holden Watson

Joseph Heerens

Youssef Marrakchi

Yuxuan Zheng

Eunsu Hur

Tiago Oliveira Marques

Honglin Zhu

Nitin Kumar

Timothy Qian

McMaster University, Hamilton, ON, Canada

Ruiyang Hong

New York University, Courant Institute, New York City, NY

Ethan Joo

Northeastern University, Boston, MA

Noble Mushtak

Princeton University, Princeton, NJ

Ben Zenker

Rensselaer Polytechnic Institute, Troy, NY

Alexander Moore

Rice University, Houston, TX

Ruofeng Liu

Rose-Hulman Institute of Technology, Terre Haute, IN

Connor Lane

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

Andrew Krapivin

Southern Illinois University, Carbondale, IL

Seth Thomason

Stanford University, Stanford, CA

Jack Albright

Hongyue Li

Andrei Mandelshtam

Karthik Seetharaman

University of British Columbia, Vancouver, BC, Canada

Jiang Xu (Justin) Wan

University of California, Berkeley, CA

Preston Fu

Theodore Lysek

Jianzhi Wang

University of California, Los Angeles, CA

Varit Chantranuwathana

Isaac Li

Alvin Liu

University of California, San Diego, CA

Mark Barbone

University of Florida, Gainesville, FL

Jake Frazer

Samuel Kim

University of Illinois, Urbana-Champaign, IL

Adrian Calinescu

University of Iowa, Iowa City, IA

Edward Li

University of Maryland, College Park, MD

Phillip Guo

University of Minnesota, Minneapolis, MN

Andrew Hale

Ryan McGregor

University of New Hampshire, Durham, NH

Daniel Bujno

University of Texas, Dallas, TX

Evan Bailey

University of Toronto, Toronto, ON, Canada

Alptekin Can Goksan
Lucas Jacobs

Luke McCutcheon
Jing Wang

University of Utah, Salt Lake City, UT

Emil Geisler

University of Washington, Seattle, WA

Gregory Baimetov

University of Waterloo, Waterloo, ON, Canada

Arthur Bright
Andrew Dong
Kevin Wan

University of Wisconsin, Madison, WI

Jonah Guse

Utah Valley University, Orem, UT

Daniel South

Vanderbilt University, Nashville, TN

Serhii Mytsyk

Washington University, St. Louis, MO

Nicholai Dimov

Williams College, Williamstown, MA

Jonathan Geller

Yale University, New Haven, CT

Deyuan Li
Ran Wang

Students Ranked 211-500

Listed by university in alphabetical order

Amherst College, Amherst, MA

Derek Zhang

Arizona State University, Tempe, AZ

Matthew Hurley

Walker Kroubalkian

Binghamton University, Binghamton, NY

Levi Axelrod

Bowdoin College, Brunswick, ME

Ethan Winters

Brigham Young University, Provo, UT

Eli Child

Graeme Clayton

Brigham Young University, Laie, HI

Erdenebileg Erdenebat

Brown University, Providence, RI

Luke Choi

Sudatta Hor

Nathan Smith

Xiaochi Zhang

Andy Zhu

California Institute of Technology, Pasadena, CA

Toyesh Jayaswal

Victor Li

Evan Wang

California Polytechnic State University, San Luis Obispo, CA

Joel Anderson

Carleton College, Northfield, MN

Bowen Li

Sebastian Vander Ploeg Fallon

Erin Watson

Carnegie Mellon University, Pittsburgh, PA

Alan Abraham	Jeungyoon Kim	Thomas Yong Hee
Kevin Cao	Vinod Krishnamoorthy	Song
Siyuan Chen	Thomas Lam	David Tang
Rohit Dasanoor	Yuelin Li	Lohith Tummala
Hari Desikan	Steven Liu	Haveesh Viswanatha
Russell Emerine	Dhruva Naidu	Daniel Wang
Weizhen Gao	Advait Nene	Eric Wang
Charles Gong	Yan Pan	Jason Yao
Justin Hsieh	Sam Rosenstrauch	Braden Yates
Yi-Cheng Huang	Ishin Shah	Kevin You
Iris Jiang	Parth Shastri	Zhehan Yu
Eric Kim	Matthew Snodgrass	Beilun Zhang

Colby College, Waterville, ME

Thor Gabrielsen

Columbia University, New York City, NY

Ryan Anselm
Hao Cui
Neilesh Shrotri

Cornell University, Ithaca, NY

Rowan Hess
Zhengnan (Santiago) Lai
David Lin
Ambrose Yang
Songyu Ye
Ruogu Zhang

Dalhousie University, Halifax, NS, Canada

Xiaoyu Jia

Davidson College, Davidson, NC

Kenan Wood

Duke University, Durham, NC

Feng Cong	Erick Jiang
Angikar Ghosal	Hung Le
	Shuhuai Yu

Georgia Institute of Technology, Atlanta, GA

Joseph Campbell	Anant Gupta
Ruijia Cao	Lance Lampert
Christian Engman	Neil Patram

Hamilton College, Clinton, NY

Trevor Scheuing

Harvard University, Cambridge, MA

Preston Bushnell

Tanav Choudhary

Deuce Ditton

Kevin Du

Dhruv Goel

Michael Hwang

Hahn Lheem

David Li

Jerry Liang

Jinho Park

Ilaria Seidel

Daniel Sheremeta

Easton Singer

Harvey Mudd College, Claremont, CA

Tiger Che

Ian Shors

Maxwell Thum

Nicole Wu

Haverford College, Haverford, PA

William Bender

Logan Post

Iowa State University, Ames, IA

Andrew Osborne

Henry Simmons

Johns Hopkins University, Baltimore, MD

Sean O'Connor

Tian Zhou

Kent State University, Kent, OH

Nathaniel Miller

La Salle University, Philadelphia, PA

Nicholas Radley

Massachusetts Institute of Technology, Cambridge, MA

Aleksandr Abelyan	Freya Edholm	Isabel McGuigan
Ishank Agrawal	Chirag Falor	Unubold Munkhbat
Khalid Ajran	Vincent Fan	Samuel Packman
Carlos Alvarado	Jonathan Fei	Juan Reyes
Serena An	Shu Ge	Sumedh Shenoy
Sophia Benjamin	Abhinav Goel	John Sragow
Joseph Camacho	Ram Goel	David Vulakh
Jose A. Cazares Torres	Ezra Guerrero Alvarez	Mason Wang
Alvin Chen	Joshua Guo	Christopher Wu
Abdellatif Anas	James Hawkes	Nathan Xiong
Chentouf	Alexander Hu	Jason Yang
Dev Chheda	Kaylee Ji	Andrew Yao
Matthew Cho	Gabriel Kammer	Kevin Zhao
Neil Chowdhury	Ashley Ke	Wayne Zhao
Owen Conoly	Aidan Leonard	Sebastian Zhu
Jakob de Raaij	Saba Lepsveridze	

McGill University, Montreal, QC, Canada

Alexander Koran

McMaster University, Hamilton, ON, Canada

Kevin Zhao

Miami University, Oxford, OH

Hiep Trinh

Michigan State University, East Lansing, MI

Erik Brodsky
Joseph Noonan

Missouri University of Science and Technology, Rolla, MO

Braden Stillmaker

Mount Allison University, Sackville, NB, Canada

Crystal Sharpe

North Carolina State University, Raleigh, NC

Mason McElroy
Jarod Schneider

Northeastern University, Boston, MA

Devin Brown
Toby Busick-Warner

Oberlin College, Oberlin, OH

Jake Berran
Augustine Fisher
Deron Lessure

Ohio State University, Columbus, OH

Kabir Belgikar
Pranav Jois

Princeton University, Princeton, NJ

Adam Huang	Julian Shah
Sunay Joshi	Ronan Soni

Purdue University, Lafayette, IN

Ethan Brady
Adam Clay
Nicholas Song

Queens University, Kingston, ON, Canada

Raymond Jing

Reed College, Portland, OR

Apollo Albright
Bryant Morrell

Rice University, Houston, TX

Evan Huang	Mark Saving
Arie Ogranovich	Benjamin Schussler

Rochester Institute of Technology, Rochester, NY

Dominick Banasik
Cade Reinberger

Rose-Hulman Institute of Technology, Terre Haute, IN

Benjamin Lyons

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

Justin Kim	George Tsoukalas
Michael Schleppy	Eric Yang

St. Mary's College of California, Moraga, CA

Gregory Hess

Simon Fraser University, Burnaby, BC, Canada

Hyeyoung Ahn

St. Olaf College, Northfield, MN

Benjamin Grant

Stanford University, Stanford, CA

Ryan Catullo

Michael Cho

Yunchu Dai

Michael Doboli

Tae Kyu Kim

Vrishab Krishna

Sidhart Krishnan

Dylan Mahoney

Bradley Moon

Anthony Zhan

Stony Brook University, Stony Brook, NY

Longzhen Chen

Swarthmore College, Swarthmore, PA

Kai Williams

Tarrant County College - Northeast Campus, Hurst, TX

Matthew Walton

Texas A&M University, College Station, TX

Joseph Chau

William Frendreiss

Texas Christian University, Fort Worth, TX

Duc Toan Nguyen

University of Alabama, Huntsville, AL

Zachary Nunez

University of Alabama, Tuscaloosa, AL

Jacob Glidewell

Joseph Kasel

Justin Saye

University of Alberta, Edmonton, AB, Canada

Edmond Tuong

University of British Columbia, Vancouver, BC, Canada

Oakley Edens

Neo Huang

University of California, Berkeley, CA

Aditya Baireddy

Atticus Cull

Shawnak Deb

Andrew Lee

Austin Lei

Wentinn Liao

Bradley Louie Saito

Herman Malik

Youngmin Park

Shreyas Ramamurthy

Zachary Slonim

Yuchan Yang

University of California, Davis, CA

Zachary Graeber
Nicolas Guerra
Chen Liang

University of California, Los Angeles, CA

Xuanhao Cui	Sumith Nalabolu
Eric Gan	Sachin Sahay
Zelong Li	John Xiaoshu Zhou

University of California, San Diego, CA

Shubham Bhargava
Eugene Chiou
Jason Zhang

University of California, Santa Barbara, CA

Theodore Bafrali	Dongming Hua
Zachary de Tagyos	Christian Reynaldo
	Justin Wu

University of Central Florida, Orlando, FL

Connor Shrader
Seba Villalobos

University of Chicago, Chicago, IL

Cameron Chang	Benjamin Slater
Kiran Duggirala	Rachel Struck
Shiv Seshan	Derek Zhu

University of Florida, Gainesville, FL

Alejandro Leon	Jake Shannin
Joshua Mott	Cole Travers

University of Illinois, Urbana-Champaign, IL

Brendan Biernacki
Praneet Rathi
Matthew Tang

University of Iowa, Iowa City, IA

Nick Morrow

University of Kansas, Lawrence, KS

Shad Ahmed Shahul Hameed

University of Louisiana, Lafayette, LA

Scott Whitman

University of Michigan, Ann Arbor, MI

Marcus Gozon
Tuong Le

Alvin Li
An Nguyen
Bohang Yu

University of Minnesota, Minneapolis, MN

Nathan Mihm
Dinh Quan Tran

University of Nevada, Reno, NV

Daniel Leary

University of New Brunswick, Fredericton, NB, Canada

James Petersen

University of Notre Dame, Notre Dame, IN

Andrew Brooks
Gavin Dooley

Weike Fang
Shenghua Liu

University of Pennsylvania, Philadelphia, PA

Kaan Erdogmus
Eric Myzelev
Zhong Zhang

University of Southern California, Los Angeles, CA

Benjamin Cohen
Wenhao Zhang

University of Tennessee, Knoxville, TN

Franklin Zhang

University of Texas, Austin, TX

Joseph Hummel
Om Joshi

Luis Kim
James Rayman

University of Texas, Dallas, TX

Suraj Mathashery
Weston Miller

University of Toronto, Toronto, ON, Canada

Ethan Bottomley-

Mason

Benjamin Edidin

Kevin Jain
Chayim Lowen

Alexander Ryabchenko
Jibran Iqbal Shah

Louis Ryan Tan

University of Virginia, Charlottesville, VA

Declan Stacy

University of Washington, Seattle, WA

Griffin Golias
Coby Tran
Casey Zhao

University of Waterloo, Waterloo, ON, Canada

Leo Guan
Valentio Iverson
Tianqi Jiang
Max Jung
Avaneesh Kulkarni

Arnav Kumar
Max Li
Nathan Lo
Filip Milidrag
Quan Taian

Christopher Trevisan
Xinyue Xie
Michael Yang
Xunchao Zhang

University of Wisconsin, Madison, WI

Kyle Boone
Yangkun Dai

Tianlong Huang
Yuval Lerman
Yufei Zhan

Vanderbilt University, Nashville, TN

Gabriel Diraviam
Abihith Kothapalli

Wesleyan University, Middletown, CT

Ford McDill

Williams College, Williamstown, MA

Justin Cheigh
Timothy Chen
Maxim Enis

Rauan Kaldybayev
Yuan Qiu
Chenyang Sun

Worcester Polytechnic Institute, Worcester, MA

Ben Gobler

Yale University, New Haven, CT

Seojun Lee
William Ning
Andrei Alexandru
Parfeni

Tushar Patel
Vismay Sharan
Jason Wang
Stephen Yin

Michael Ying
Aaron Yu
David Zeng
Grant Zhang