



JOANNA LIN—THE TECH

A circle of chairs sit in freshly fallen snow outside Building 24.

US lawyer Bryan Stevenson to speak at 2021 Commencement

Stevenson argued landmark Supreme Court cases

By Wenbo Wu
NEWS EDITOR

Bryan Stevenson, founder of the Equal Justice Initiative (EJI) in Montgomery, Alabama and American lawyer renowned for his work in combating bias in the U.S. criminal justice system against the poor and people of color, will be MIT's Class of 2021 Commencement speaker June 4.

Stevenson has argued and won multiple landmark cases in the U.S. Supreme Court, including *Miller v. Alabama* (2012), which broadened the Supreme Court's ruling in *Roper v. Simmons* (2005) to deem mandatory life-without-parole sentencing of children 17 and under unconstitutional.

Stevenson also successfully argued in the 2019 Supreme Court case *Madison v. Alabama* that the Eighth Amendment prohibits execution of a prisoner who cannot rationalize the reasons for their execution, whether it be due to psychosis or dementia.

Additionally, Stevenson and his staff "have won reversals, relief, or release from prison for over 135 wrongly condemned prisoners on death row and won relief for hundreds of others wrongly convicted or unfairly sentenced," the EJI webpage on Stevenson writes.

"As we face a future filled with uncertainty, now is the time for a renewed commitment to the idea that our own humanity depends on the

humanity of everyone," Stevenson told MIT News. "I look forward to speaking to the Class of 2021 as they prepare to share with the world their own signature blends of the innovation, creativity, and compassion that are celebrated at MIT."

Stevenson earned his B.A. from Eastern University in 1981 and subsequently earned a master's in public policy from the Harvard Kennedy School of Government and a J.D. from the Harvard School of Law in 1985.

"As a trailblazer at the intersection of racial reckoning and criminal justice reform, Stevenson is one of the most compelling and relevant choices for commencement

Commencement, Page 2

IN SHORT

Undergraduates returning to campus should register to receive pre-departure COVID-19 testing kits.

Spring term registration week begins on Feb. 8 and ends on Feb. 12.

MIT affiliates should complete the COVID-19 Vaccine Eligibility Form.

The I am a LEADer Conference runs from Feb. 1 to Feb. 12.

February is Black History Month.

Interested in joining *The Tech*? Email join@tech.mit.edu.

Send news and tips to news@tech.mit.edu.

Institute Divest faculty survey results shared

54% of faculty respondents believe MIT should divest from fossil fuel companies

By Kristina Chen
EDITOR IN CHIEF

MIT Divest distributed an anonymous survey to faculty members on the Institute's use of its endowment in the fossil fuel industry. MIT Divest press coordinator Nicole Cybul shared the results of the survey in an email to *The Tech*.

The survey was sent to approximately 1,620 faculty members via email between October 2020 and January 2021, with the majority of faculty receiving the email in January. 285 faculty responded to the

survey, for an estimated response rate of 17.5%.

The survey asked faculty for their department number and whether they had an opinion about MIT divesting from fossil fuel companies in its endowment. If they answered that they had an opinion, they were asked whether MIT should divest from fossil fuel companies (yes or no) and to optionally share a reason informing their stance.

30 respondents (10.5%) indicated that they had no opinion "about di-

Survey, Page 2



JOANNA LIN—THE TECH

In the frigid weather, a frozen cup of coffee lies abandoned.

Lander, Zuber selected for science positions in Biden's admin

Eric Lander: Honored to have the chance to serve at a 'consequential moment for science and technology'

By Daisy Wang
STAFF REPORTER

U.S. President Joe Biden selected Broad Institute Director Eric Lander and Vice President for Research Maria Zuber for top science positions in his administration.

Lander has been named both Presidential Science Advisor — a position Biden intends to elevate to Cabinet member for the first time in history — and director of the Office of Science and Technology Policy, which requires Senate confirmation. Zuber has been named co-chair of the President's Council of Advisors on Science and Technology (PCAST), along with Caltech chemical engineer and 2018 Nobel Prize in Chemistry winner, Frances Arnold.

Lander will take a leave of absence from MIT. Todd Golub is the new director of the Broad Institute, where he served previously as chief

scientific officer. Meanwhile, Zuber will continue to serve as the Institute's vice president for research.

Eric Lander

Lander has an extensive background in the sciences. After earning a B.A. in math from Princeton University in 1978 and a doctorate in math from Oxford University in 1981 through the Rhodes Scholarship, he taught courses on managerial economics, bargaining, and decision analysis at Harvard Business School.

Lander started learning about molecular biology and genetics in 1983, after his younger brother suggested that he might be interested in how biological systems process information. Shortly thereafter, he was appointed as a member of the Whitehead Institute and as a tenured professor in the department of biology at MIT in 1990. He was one of the principal leaders of the Hu-

man Genome Project from 1990 to 2003, and founded the Broad Institute in 2004.

Lander is not new to the U.S. government, having served under President Barack Obama as co-chair of PCAST, informing federal policy on science and technology from 2009 to 2017.

Lander was interviewed in MIT News, where he said that he is "deeply honored to have been asked to serve" during this "consequential moment with respect to science and technology." He said in a Broad press release that the U.S. is at its most important tipping point for science "since World War II."

Lander is especially well-known among undergraduate students for teaching 7.012 (Introduction to Biology).

Jake Yasonik '24, a first year who took 7.012 with Lander in Fall 2020, said in an interview with *The Tech*

that in class, Lander "always pointed out where the big research questions were and how to get involved, and so I got to see his forward-thinking, inclusive approach first-hand. I'm excited to have him leading the country's scientific initiatives."

Yasonik also commented on Lander's ability as a science communicator: "not only does he know the science, but he created the science, and he uniquely knows how to tell its story to the government and the public," a skill that amidst the growing mistrust of science in the former administration will prove invaluable.

Maria Zuber

Zuber holds a B.A. in astronomy and geology from the University of Pennsylvania and a Sc.M. and Ph.D. in geophysics from Brown University. She was the first woman to lead a National Aeronautics and Space Administration (NASA) spacecraft

mission, serving as principal investigator of the agency's Gravity Recovery and Interior Laboratory mission — an initiative mapping the moon's gravitational field to answer fundamental questions about the moon's evolution and internal composition — in 2008.

Zuber has held leadership roles associated with scientific experiments or instrumentation on nine NASA missions since 1990. She has also served on the national Science Board since 2012, and more recently served as NSB chair from 2016 to 2019.

She is familiar with the realm of policy as she oversees more than a dozen MIT interdisciplinary research centers, including the Koch Institute for Integrative Cancer Research, the Plasma Science and Fusion Center, the Research

Administration, Page 2

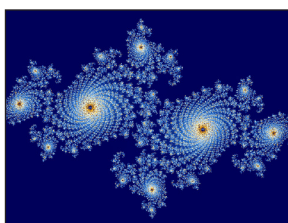
VASSAR GRADUATE DORM

The new dorm should include ground floor public and commercial space.

OPINION, p. 4

OUR SPACE ODYSSEY

The effect of astronomy on human culture. **CAMPUS LIFE**, p. 5



BLAND BROCCOLI

The fascinating features of fractals. **SCIENCE**, p. 7

CURSED THOUGHTS

Is love stored in the stomach? **CAMPUS LIFE**, p. 5

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WEATHER

Surprise, it’s still winter

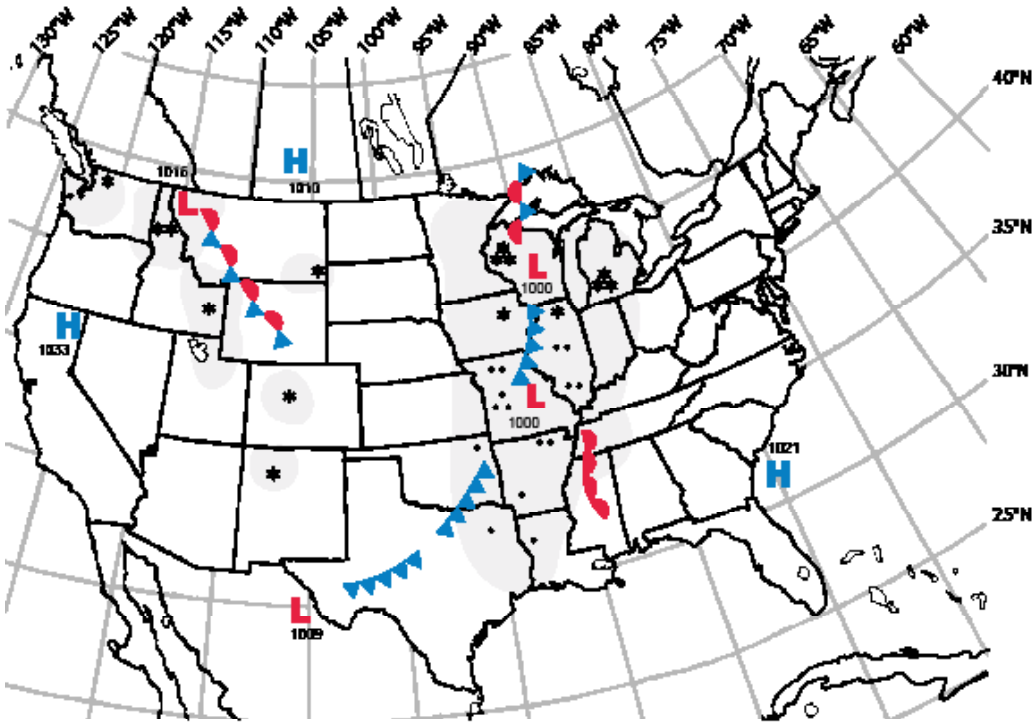
By Sarah Weidman
STAFF METEOROLOGIST

If you’re anything like me, you spent all of Monday evening watching the weather forecast and the skies, hoping that the mixed, slushy precipitation would turn into a foot of pristine snow. For those of us in the city of Boston, we were not so lucky. However, the most recent nor’easter left a snowy mark on many other parts of the country, leaving deep snow near Chicago, Philadelphia, New York City, and just to the west and north of Boston.

Although the bulk of the frozen precipitation missed Boston this time, February is still considered deep winter in New England. February is on average the second snowiest month (after January), and temperatures will only infrequently stray above 40 °F. For those of you in cold parts of the country, use this break before the spring semester to huddle beneath your blankets and drink some hot cocoa. For those of you in warm areas, take advantage of the outdoors before you (potentially) return to Boston’s bitter winter next week!

Extended Forecast

Today: Partly cloudy. High around 37°F (3°C). Northwest wind around 8-10 mph.
Tonight: Mostly clear. Low around 23 °F (-5 °C). West wind around 6-9 mph.
Tomorrow: Chance of snow, then rain. High around 41 °F (5 °C) and low around 31 °F (-1 °C). South wind around 5-10 mph with gusts up to 20 mph.
Saturday: Mostly sunny. High around 36 °F (2 °C) and low around 21 °F (-6 °C). West wind around 10-15 mph.
Sunday: Chance snow. High around 37 °F (3 °C). West winds around 8-13 mph.



Situation for Noon Eastern Time, Thursday, February 4, 2021

Weather Systems	Weather Fronts	Precipitation Symbols	Other Symbols										
High Pressure: Low Pressure: Hurricane:	Trough: Warm Front: Cold Front: Stationary Front:	<table><tr><th>Snow</th><th>Rain</th></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	Snow	Rain									Fog: Thunderstorm: Haze:
Snow	Rain												
Copyright by MIT Meteorology Staff and The Tech													

Blake: Stevenson ‘will provide a much needed perspective’ on racial disparity

Commencement, from Page 1

speaker for this year,” Undergraduate Association President Danielle Geathers ’22 told MIT News. As MIT “confront[s] our own role in perpetuating systemic racism, I expect Bryan Stevenson’s words will inspire many at the Institute to

dedicate their talents to fighting injustice,” Geathers said. MIT Class of 2021 President Kofi Blake ’21 told MIT News that as the U.S. “continues to recognize and confront its systemic racial disparities, I believe Mr. Stevenson will provide a much needed perspective on tackling these issues.”

Madeleine Sutherland G, Graduate Student Council president, told MIT News that she was “excited to learn” that Stevenson would speak at Commencement “because graduate students expressed a desire to hear from someone who has faced oppression and made a real difference in the world.” Sutherland

added that the MIT community “will learn a lot” from Stevenson’s address. Previous MIT commencement speakers include retired Navy four-star admiral William McRaven (2020), politician and entrepreneur Michael Bloomberg (2019), Facebook COO Sheryl Sandberg (2018),

Apple CEO Tim Cook (2017), and actor and director Matt Damon (2016). The Class of 2020 Commencement was held through a live, virtual webcast. It has not yet been announced whether Commencement for the Class of 2021 will be in person or virtual.

82.2% of 771 undergraduate respondents agree that MIT should divest

Survey, from Page 1

vestment from fossil fuel companies in the MIT endowment.” Of the 255 respondents who indicated that they did have an opinion, 154 (60.4% of those with an opinion, 54% of all respondents) responded that MIT should divest from fossil fuel companies. The other 101 respondents (39.6% of those with an opinion, 35.4% of all respondents) who had an opinion about divestment responded that MIT should not divest from fossil fuel companies. Cybul wrote that the survey data gives MIT Divest “some insight into how much faculty support there is for divestment,” which is useful for “talking with the MIT administration” about MIT Divest’s requests and “using faculty support to [MIT

Divest’s] advantage in pushing for divestment.” Those who responded that MIT should divest from fossil fuel companies named climate change as the primary reason. Many also wrote that MIT could demonstrate leadership and potentially influence other organizations by choosing to divest, with one respondent writing that “MIT should be a leader, not a follower.” “Fossil fuels are a primary cause of the climate crisis, and fossil fuel companies have spent decades denying or funding the denial of human-caused climate change,” wrote one respondent. Another wrote, “Set an example. Have our institutional actions match what we teach. Support the transition to renewables.” Survey respondents who answered that MIT should not divest

from fossil fuels wrote that fossil fuels will still be in use, regardless of MIT’s actions, that MIT should work with fossil fuel companies to pursue more sustainable technologies, and that MIT should not be pressured into divesting. One respondent wrote, “It’s better to engage in shareholder activism to ensure the boards give commitments about continuing that alternative energy investment. If we divest we lose all ability to do that.” “MIT should make the most prudent investments in legal activities, and avoid being jerked around by the media and political pressure,” another respondent wrote. Respondents from both sides noted that divesting from fossil fuels was not necessarily a yes or no question, with one respondent writing “there is a continuum of

concerns about fossil fuel companies. The question is posed as all or nothing. Those may not be our only options.” Another respondent wrote, “The decision to divest or not should not, and cannot, be so simple and binary. There are traditional fossil fuel companies ... who are making huge, company-wide shifts into renewable energies.” The Undergraduate Association Committee on Sustainability distributed a separate survey to undergraduates during Fall 2020 to “get a clearer idea of which sustainability-related issues” undergraduates “know and care about,” according to the committee’s sustainability survey data report. 934 undergraduates, approximately 21.5% of the undergraduate student body, responded to the survey.

The survey included questions asking respondents to indicate their agreement with the statements “I care about MIT’s relationship with fossil fuel companies,” and “I believe MIT should commit to divestment from fossil fuels.” Of the 771 respondents who answered the two questions, 16% either strongly disagreed, somewhat disagreed, or neither agreed or disagreed with the first statement, that they cared about MIT’s relationship with fossil fuel companies. 83.9% either somewhat or strongly agreed with this statement. For the second statement, of the 771 respondents, 82.2% either somewhat or strongly agreed that “MIT should commit to divestment from fossil fuels.” The other 17.8% of respondents responded either unsure, somewhat disagree, or strongly disagree.

Zuber: any solution must have crucial element of ‘rebuilding trust in science’

Administration, from Page 1

Laboratory of Electronics, the Institute for Soldier Nanotechnologies, the MIT Energy Initiative, and the Haystack Observatory. She is also responsible for MIT’s research in-

tegrity and compliance, and plays a central role in research relationships with the federal government. Zuber echoed Lander’s points in MIT News, stating that any solution must have the essential element of “rebuilding trust in science” and that she’s “thrilled to have the op-

portunity to drive positive change” whilst working with President Biden. Arnav Patel ’21, a student who has worked with Zuber and her office through the Climate Action Advisory Committee as a representative of MIT Divest, said in

an interview with *The Tech*, “It’s good that another MIT voice will be helping bring science and fact-based policy back to the government.” He added that her appointment “means the work and actions that MIT take are going to be a lot

more scrutinized and highlighted given the connections to the new presidential administration.” Patel hopes Zuber uses “her position to help drive more aggressive pro-climate policies here at MIT and there in D.C. than currently exist in both places.”

DID YOUR MIT ESSAYS GET YOU IN?

The Tech is collecting successful application essays (hint: yours!).
Email your pieces to cl@tech.mit.edu!

Solution to To the Moon
from page 8

1	2	3	5	9	8	7	4	6
5	8	7	6	4	2	9	1	3
9	4	6	7	1	3	8	5	2
2	6	1	8	3	4	5	9	7
4	5	8	2	7	9	3	6	1
3	7	9	1	6	5	2	8	4
7	3	4	9	8	1	6	2	5
6	9	5	4	2	7	1	3	8
8	1	2	3	5	6	4	7	9

Solution to Diamond
from page 8

6	5	4	1	2	3
1	6	5	2	3	4
4	3	2	5	6	1
2	1	6	3	4	5
5	4	3	6	1	2
3	2	1	4	5	6

Solution to Trippable
from page 8

C	A	R	O	M	I	T	C	H	A	R				
S	O	R	E	D	A	T	A	H	O	M	E	S		
C	R	A	C	K	E	D	S	I	D	E	W	A	L	K
A	R	M	I	E	S	W	A	X	T	E	A			
L	A	I	T	Y	I	P	A	D	N	E	A	T		
E	L	S	E	R	I	N	H	O	U	S	E			
A	T	O	Z	S	E	E	R	E	D					
B	A	N	A	N	A	P	E	E	L	S				
F	I	R	S	T	S	Z	E	A	L					
A	C	U	T	E	C	Z	A	R	T	A	P	S		
N	A	N	O	B	O	Y	S	T	A	B	L	E		
O	N	E	B	A	A	R	E	M	A	I	N			
U	N	T	I	E	D	S	H	O	E	L	A	C	E	S
T	O	T	A	L	T	O	W	N	L	U	R	E		
T	E	N	T	S	E	N	T	E	S	S				

WANTED

sports·writ·er(s)
/'spôrts,rīdərs/
noun
noun: sports writers
journalists who write about sports.

No prior experience needed! Just an interest in sports. And probably writing.

For more information, please contact sports@the-tech.mit.edu

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SCIENCE IN YOUR LIFE

For the love of broccoli

Fractals are ubiquitous in nature and mathematics

By Robert Koirala

There is broccoli at MIT's dining halls almost every week. The broccoli is usually steamed or roasted. Although I miss the garlic, ginger, oil, onions, coriander seed, chili, methi, and masala that go well with broccoli, I enjoy eating it bland. I should instead say that I love staring at its details. When broccoli is cooked well with spices, either the details get destroyed or the spices obscure the details. On the other hand, with steamed, unseasoned broccoli, I can look at its hierarchy of stalks that are self-similar at all levels and detailed heads to the point that my food gets cold.

Whoever made the first broccoli must have tried to sculpt the details at an even smaller scale to show the existence of a fractal but failed to do so because of limited time. I feel good about the creator because they never had to worry about the uniqueness part of the solution. Nevertheless, they seemed to have tried hard to prove a fractal's existence in cauliflower, Queen Anne's lace, ferns, mountains, and coastlines to no avail. Well, a physicist could argue that broccoli is close enough to be a fractal: a stalk resembles the whole broccoli. A smaller stalk resembles a bigger stalk and so on. But for a mathematician, it does not have details smaller than the leaves that look like the whole broccoli. So, it does not qualify as a rigorous fractal.

"Fractal" must be a cousin of "fracture," as fractals are broken in some sense. Consider a fractal called a middle third Cantor set. Take an interval from 0 to 1 in the real number line. Delete the middle third of the line (excluding its endpoints). We should get two lines: one from 0 to $1/3$ and the other from $2/3$ to 1. With each of these lines, delete their middle third and continue the process forever. What is left after this iteration is the Cantor set. It is fractal because of its self-similarity at all levels. And it is constructed by breaking lines. However, not all fractals are broken.

Fractal could be a foe of “fair,” since they are rough. Even the close-enough fractal, broccoli, is rough. If you have taken 18.100B (Real Analysis), you must know about the nowhere-differentiable function. For those who don’t, when you zoom in enough on a differentiable function, say x squared at any point, you will start to see a straight line. But for a nowhere differentiable function, the function always has some roughness and a straight line never appears if you keep zooming in. In fact, the zoomed portion always has details that resemble the whole function. The complex details account for the roughness.

Fractal should be a mutant of "fraction," as fractals have "fractional" dimensions. Take a square whose sides are a unit

length. It is made up of 2^2 squares with sides of $1/2$ length. On another note, it is also made up of 4^2 squares with sides of $1/4$ length. Similarly, a cube whose sides are a unit length is made up of 2^3 cubes of sides of $1/2$ length. Or we could also say it is made up of 4^3 cubes with sides of $1/4$ length. Note that the exponents in both cases carry the information of the dimension of objects.

Mathematically, suppose a set is composed of n sets that are a scaled down (by r units) version of the original set. Then the dimension of the set is $d = \ln(n) / \ln(r)$. Now consider the Cantor set. The essence of the construction of the Cantor set is in taking out the middle third of lines. Therefore, the points that we get after a deletion procedure starting with $[0, 1]$ are similar to those starting with $[0, 1/3]$ and $[2/3, 1]$. So, the new Cantor set consists of two copies of a scaled down (by three units) version of the original Cantor set. Therefore, its dimension has to be $\ln(2) / \ln(3) \approx 0.63$ which is definitely not an integer.

As of now, you might be thinking that fractals are akin to "fiction." They sound like mathematical fiction. After all, the examples in the real world that I gave are definitely not fractals because they are not infinitely broken and self-similar. Nor do they have fractional dimensions. Nevertheless, the creator of broccoli was successful

in creating other fractals in the real world. It took an MIT physicist, Ed Lorenz, and an MIT computer scientist, Ellen Fetter, to figure out that the equation that models the convection of atmosphere can have fractals. Further, fractals occur in chemical reactions (see Strogatz) and in population modeling (such as in the logistic map). Fractals are not fiction, so fractals must have an affair with “factual.”

Actually, fractal has traits of “frenzy,” as they usually appear in a chaotic environment. In the model that Ed Lorenz studied, fractals appear when the convection is chaotic. Even in a chemical reaction, the fractals appear in a chaotic reaction.

I am certain that fractal is a forebear of "fabulous." "Freakish" sounds closer to fractal, though. Regardless, fractals are so fantastic that I have fun staring at them.

They have a rich underlying mathematical beauty. The weird fractional dimension and self-similarity are only some aspects of it. One can do a whole lot of analysis on fractals. For instance, one can define a Laplacian on it. Recall that the standard Laplacian is used in modeling the heat equation. In a loose sense, it models the evolution of the temperature of a solid. The Laplacian involves two derivatives, and derivatives are defined on a smooth domain. But fractals as we have seen are not smooth. So, it takes some effort to define Laplacian

(see Kigami). After we develop a Laplacian, we can model how the temperature of a hot fractal will evolve. One could also generalize the ideas like the uncertainty principle to fractals (see Dyatlov).

I get excited about all these things just by looking at the close-enough fractal, broccoli. More specifically, bland broccoli. Thus, I would like to thank the chefs at MIT's dining halls for not adding any spices to broccoli.

For beautiful pictures of fractals:

Barnsley, M. F. (1988) *Fractals Everywhere* (Academic Press, Orlando, FL).

Feder, J. (1988) *Fractals* (Plenum, New York).

Mandelbrot, B. B. (1982) *The Fractal Geometry of Nature* (Freeman, San Francisco).

Peitgen, H.-O., and Richter, P. H. (1986)
The Beauty of Fractals (Springer, New York)

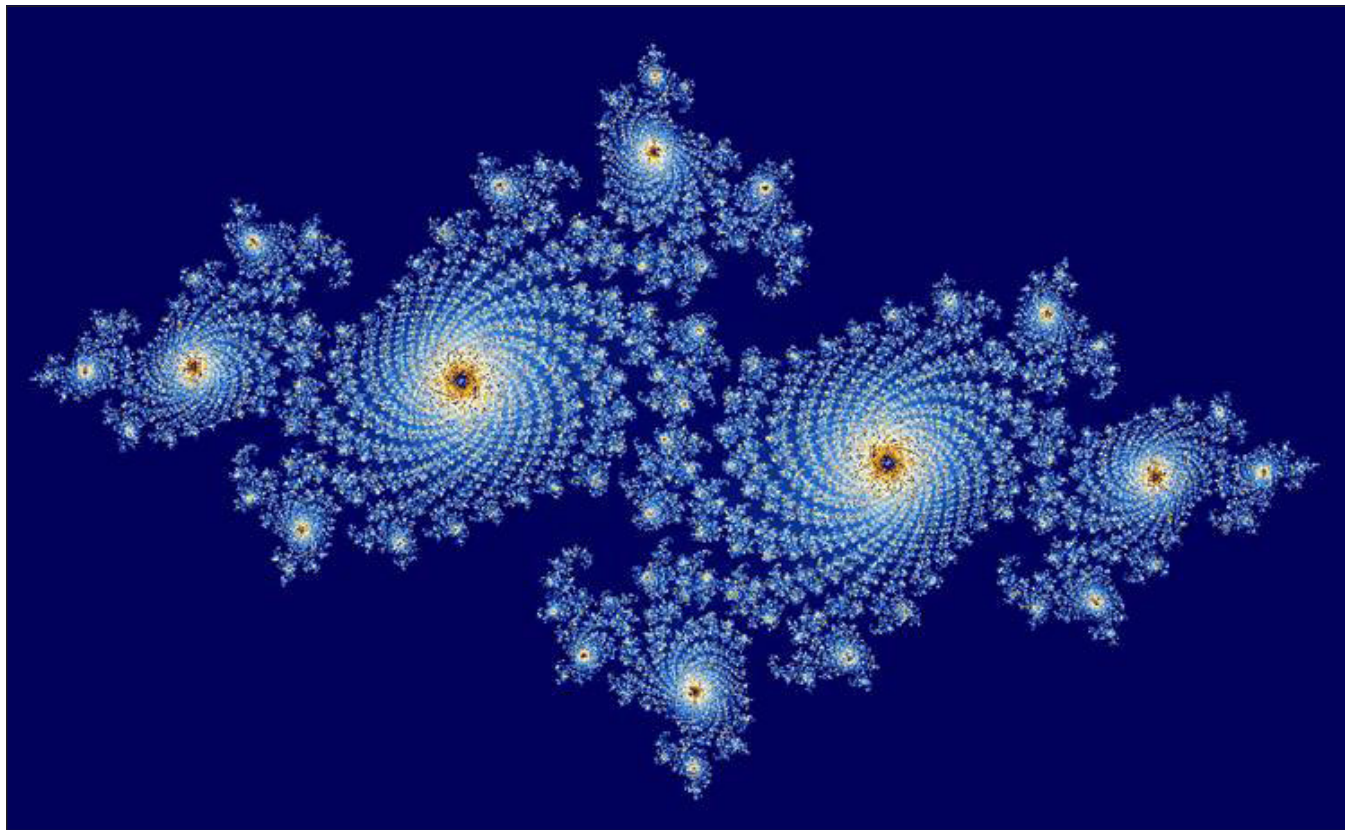
Schroeder, M. (1991) *Fractals, Chaos, Power Laws* (Freeman, New York).

For advanced math:

Dyatlov, S. (2019) *An Introduction to Fractal Uncertainty Principle*. <https://arxiv.org/abs/1903.02599>

Kigami, J. (2001) *Analysis on Fractals* (Cambridge University Press, Cambridge, UK).

Strogatz, S. H. (2015) *Nonlinear Dynamics and Chaos with Applications to Physics, Biology, Chemistry, and Engineering* (CRC Press, New York).



IKAMUSUMEFAN—WIKIPEDIA

The Julia set is a fractal studied in complex dynamics.

Want to see these teams battle it out in person?

Join *The Tech!*
sports@tech.mit.edu

Solution, page 3

Instructions: Fill in the grid so that each column, row, and 3 by 3 grid contains exactly one of each of the digits 1 through 9.

Solution, page 3

Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

Solution, page 3

- 1 Elevator compartment
- 4 Decide to leave out
- 8 Blacken on a grill
- 12 Feeling achy or angry
- 13 Statistics
- 14 Real-estate listings
- 16 Broken concrete you might trip on
- 19 Military troop groups
- 20 What candles are made of
- 21 Hot beverage for Brits
- 22 Churchgoing group
- 23 Apple's tablet
- 25 Having no clutter
- 26 Otherwise
- 27 Nickname for Ireland
- 28 Real-estate listing
- 29 The whole alphabet
- 30 Become angry
- 31 Fruit skins you might trip on
- 34 Never-happened-before events
- 36 Enthusiasm

- 37** Sharp, as eyesight
- 38** Business titan
- 39** Touches on the shoulder
- 43** "Billionth" prefix for second
- 44** Young lads
- 45** Kitchen furniture
- 46** __ in a million (very rare)
- 47** Remark from a ram
- 48** Stick around
- 49** Sneaker strings you might trip on
- 53** Bottom-line invoice amount
- 54** Small city
- 55** Entice
- 56** Canvas shelter
- 57** Mailed away
- 58** Half a figure-eight

- 1 Ranch's horse enclosure
- 2 One of the Musketeers
- 3 Say from memory
- 4 Praiseful poems
- 5 Angry
- 6 Part of TGIF

- 7 The Republic of China
- 8 Square-shaped cereal brand
- 9 "In what way?"
- 10 Athletes who aren't paid
- 11 Publicist's handout
- 12 Bottom-of-map info
- 15 Glided around on ice
- 17 Bottom-of-map info
- 18 Family man
- 23 Laundry appliance
- 24 Full of flair
- 25 Christmas season
- 27 When trains are expected:
Abbr.
- 28 Achilles __ (weak spot)
- 29 Poker hand starter
- 30 Blacken on a grill
- 31 Person with dark hair
- 32 Concerning, in a memo
- 33 Pod vegetables
- 34 Search in a spreading
fashion
- 35 Polite refusal
- 38 Seaside
- 39 "Hot" Mexican food

40 Ancient adding machine
41 Toolbox gripper
42 Have a feeling
44 Not well done
45 ____ Aviv (Israeli city)
47 Removable waistband
48 Apartment expense
50 Novelist Fleming
51 Weed-chopping tool
52 To each her ____

The comic strip consists of four panels. Panel 1: A man and a woman are talking. The man says, "I FEEL LIKE BY NOW I SHOULD KNOW ABOUT THE STOCK MARKET. WHAT IS INVESTING? DO YOU JUST OPEN A WEBSITE AND PICK THE COMPANIES YOU LIKE?" Panel 2: The man and woman are still talking. The woman replies, "WELL, YOU TOTALLY CAN. BUT THERE'S A LOT OF EVIDENCE THAT NO INVESTING STRATEGY CONSISTENTLY PICKS STOCKS THAT OVERPERFORM THE AVERAGE OF THE WHOLE MARKET. A LOT OF FUND MANAGEMENT IS A MYTH." Panel 3: The woman is shown in a close-up, looking thoughtful or slightly exasperated. She says, "HUH, OKAY. BUT THERE'S A WEIRD COROLLARY TO THAT IDEA: IT IMPLIES THAT, IGNORING FEES AND STUFF, IT'S JUST AS HARD TO CONSISTENTLY LOSE MONEY BY PICKING BAD STOCKS FROM AN INDEX." Panel 4: The man and woman are talking again. The man says, "IF SOMEONE COULD CONSISTENTLY BUY BAD STOCKS, YOU COULD BEAT THE AVERAGE BY HIRING THEM, LETTING THEM PRETEND TO INVEST, THEN BUYING EVERY STOCK EXCEPT THE ONES THEY PICK. IN A WAY, BAD JUDGMENT IS JUST AS HELPFUL AS GOOD JUDGMENT." The woman replies, "OH MY GOD. I CAN DO THAT! NO, IT'S JUST AN EXAMPLE— THIS IS THE JOB I WAS BORN FOR." Panel 5: A man in a suit is sitting at a desk, looking at a computer screen. A speech bubble from the screen says, "SOON... HEY, THIS COMPANY'S CEO WANTS REVENGE ON THE SAME GHOST AS ME! I'M BUYING! OOH, AND THIS ONE IS PLANNING TO DEVELOP A 'CAMPING ROOMBA.' THAT'S A SURE BET!" Panel 6: The man in the suit is talking to another man who is holding a clipboard. The man in the suit says, "DROP COMPANIES #208 AND #1434 FROM THE INDEX." The man with the clipboard replies, "DONE."

I FEEL LIKE BY NOW I SHOULD KNOW ABOUT THE STOCK MARKET. WHAT IS INVESTING? DO YOU JUST OPEN A WEBSITE AND PICK THE COMPANIES YOU LIKE?

WELL, YOU TOTALLY CAN. BUT THERE'S A LOT OF EVIDENCE THAT NO INVESTING STRATEGY CONSISTENTLY PICKS STOCKS THAT OVERPERFORM THE AVERAGE OF THE WHOLE MARKET. A LOT OF FUND MANAGEMENT IS A MYTH.

HUH, OKAY. BUT THERE'S A WEIRD COROLLARY TO THAT IDEA: IT IMPLIES THAT, IGNORING FEES AND STUFF, IT'S JUST AS HARD TO CONSISTENTLY LOSE MONEY BY PICKING BAD STOCKS FROM AN INDEX.

IF SOMEONE COULD CONSISTENTLY BUY BAD STOCKS, YOU COULD BEAT THE AVERAGE BY HIRING THEM, LETTING THEM PRETEND TO INVEST, THEN BUYING EVERY STOCK EXCEPT THE ONES THEY PICK. IN A WAY, BAD JUDGMENT IS JUST AS HELPFUL AS GOOD JUDGMENT.

OH MY GOD. I CAN DO THAT! NO, IT'S JUST AN EXAMPLE— THIS IS THE JOB I WAS BORN FOR.

SOON... HEY, THIS COMPANY'S CEO WANTS REVENGE ON THE SAME GHOST AS ME! I'M BUYING! OOH, AND THIS ONE IS PLANNING TO DEVELOP A "CAMPING ROOMBA." THAT'S A SURE BET!

DROP COMPANIES #208 AND #1434 FROM THE INDEX. DONE.

On the news a few days later, "Buzz is building around the so-called 'camping Hooomba' after a big investment. Preorders have spiked, and..."



by Randall Munroe